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Field Experiments with Wheat.

COWRA EXPERIMENT FARM.

V.—A MANURIAL TRIAL; and VII.—A HARVESTING TRIAL, 1907-1912.

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[The discontinuance of these experiments on their present site, owing to the prevalence of black oats and other weed growth in the continuous wheat section, and the transfer of this section to another part of the Farm, make the time an opportune one to publish a complete summary of the results. During the six years in which the experiments have been carried out on a comparable basis, sufficient data have come to light to warrant the drawing of certain broad conclusions. Many of these were referred to in the article on "Continuous Wheat Growing" in the May issue of the *Agricultural Gazette*, while others are indicated in the present report. The outstanding feature of the experiments is the value of superphosphate in improving yields when wheat is cultivated continuously, and the advantage of either bare fallowing or growing a fodder crop in maintaining fertility. The burning of the straw appears better practice under Cowra conditions when wheat is grown continuously, while there is very little advantage to be gained by either of the three methods of disposing of the straw under bare fallow or fodder crop The Experiments Supervision Committee, under whose control the experiments have been carried out, present the report as the first definite instalment of the work done in connection with this important investigation.—ED.]

As these two experiments are interdependent, the results obtained from them are dealt with in the one report.

Experiment VII.

Object:—To determine the effect upon the succeeding wheat crop, *i.e.*, upon the fertility of the soil—of the different methods of dealing with the straw after the grain has been harvested. Briefly, this experiment determines the relative merits of the different methods of harvesting as practised by our farmers.

This experiment is divided into three sections, so that comparisons can be made under different conditions of growing wheat, viz. :—

Section 1.—When wheat is grown each year on the same land ;

Section 2.—When wheat is grown in alternate years on the same land, a fodder crop being grown in other years ; and

Section 3.—When wheat is grown in alternate years on the same land, the land in other years being bare fallowed.

Each section is in turn divided into three blocks, which are compared with one another, and in which (1) the straw is burnt, (2) the straw is removed with a reaper and binder, and (3) the straw is ploughed under. The first block represents the practice of harvesting with the stripper and burning off the straw ; the second, the practice of harvesting with the reaper and binder ; and the third, the practice of harvesting with the stripper and ploughing in the straw.

Each section is thus subdivided into three blocks. Sketch A shows the arrangement of the sections, and Sketch B the arrangement of the blocks and the manner in which they are harvested.

A comparison of the results obtained in each section will furnish information as to the most suitable system of growing wheat in this district—*i.e.*, whether wheat grown each year on the same land, or in alternate years in conjunction with either bare fallow or fodder crops, is the most profitable.

Experiment V.

Object:—On each of the blocks mentioned above a manurial trial is conducted to ascertain the chemical needs of the soil, under the different rotations and methods of harvesting practised, by the effect upon the yield of the wheat crop of the continued application of simple and mixed fertilisers or no fertiliser at all to the same land. Each block is divided into plots, which are manured as in Sketch C.

Fodder Crops in Section 2.

The fodder crops grown in connection with Section 2 have been, during the various years, as follow:—

1906—Black tares. 1908—Rape.
1907— „ 1909—Black tares.
1910—Rape, which was destroyed by the depredations of caterpillars, necessitating resowing with Skinless barley.
1911—Rape.
1912—Black tares and barley (mixed).

These fodder crops were never fed-off as a whole, but were always ploughed in. It would have been permissible to feed-off each plot separately.

Blocks Required.

The number of blocks required were as follows:—

In Section 1, where wheat is grown each year on the same land, one set of three blocks, namely, G IX, X, and XI.

In Sections 2 and 3, in which wheat is grown alternately with fodder crops and bare fallow respectively, two sets each of three blocks. In Section 2, B II, III, and IV were cropped with wheat in alternation with F VII and VIII and C VIII, the former being cropped in 1907, 1909, and 1911, and the latter in 1908, 1910, and 1912. In Section 3, B V, VI, and VII were cropped with wheat in alternation with F IX, X, and XI, the former being cropped in 1907, 1909, and 1911, and the latter in 1908, 1910, and 1912.

Treatment of Land prior to Planting Wheat

The land was cleared and broken up in 1906, and prior to the commencement of these experiments the land required for each section was cropped for one year uniformly with wheat, namely:—In G IX, X, and XI, Federation; in F VII, VIII, IX, X, and XI, and G VIII, Plover; and in B II, III, IV, V, VI, and VII, Schneider. This treatment was such as would tend to make the land for each section uniform and even.

Sketch A.

Arrangement of sections.

SECTION 1.	Wheat every year.	
SECTION 2.	Wheat and fodder crops in alternate years.	*These two subsections are cropped with wheat alternately.*
SECTION 3.	Wheat and bare fallow in alternate years.	*These two subsections are cropped with wheat alternately.*

Sketch B.

Arrangement of blocks.

BLOCK 1.	Harvested with Stripper. Straw burnt.
BLOCK 2.	Harvested with Stripper. Straw removed with Reaper and Binder.
BLOCK 3.	Harvested with Stripper. Straw ploughed in.

Sketch C.

Arrangement of Plots.

PLOT 1.	No manure.	*Check Plot*
PLOT 2.	Sulphate of Ammonia or Dried Blood.* Superphosphate.	
PLOT 3.	Superphosphate.	
PLOT 4.	Sulphate of Potash.	
PLOT 5.	No manure.	*Check Plot.*
PLOT 6.	Sulphate of Ammonia or Dried Blood.*	
PLOT 7.	Sulphate of Ammonia or Dried Blood.* Sulphate of Potash.	
PLOT 8.	Superphosphate. Sulphate of Potash.	
PLOT 9.	Sulphate of Ammonia or Dried Blood.* Superphosphate. Sulphate of Potash.	
PLOT 10.	No manure.	*Check Plot.*
PLOT 11.	DIVISION.	

* See Manurial Table on page 6 for complete method of manuring throughout the six years.

Preparation of the Land.

As soon as possible after the wheat grain was harvested, the straw on Block II in all sections was cut with a reaper and binder and removed. The straw on Block I was then burnt. After this was done, the land in Sections 1 and 2 was disc-ploughed about 5 inches deep, in accordance with a plan which ensured that all the ridges and "clean-out" furrows were located at the boundaries of the plots or on the divisions, as soon as possible, and immediately harrowed down to a fine tilth in readiness for sowing the succeeding crop.

Section 1 was then sown with wheat during the latter half of the sowing season.

Section 2 was sown with a fodder crop as soon as seasonable. The fodder crops which were grown are enumerated under "Rotations and Cover Crops."

Section 3 was allowed to remain undisturbed until early spring, when it was disc-ploughed about 5 inches deep, in accordance with a plan which ensured that all the ridges and "clean-out" furrows were located at the boundaries of the plots or on the divisions.

In Section 2, the fodder crop was ploughed under in the spring, the ploughing being similar to that on Section 3. Unless special circumstances, such as excessive weed growth, required otherwise, the ground in Sections 2 and 3 was left as ploughed until the succeeding wheat harvest was over. The ground was then cultivated in a uniform and thorough manner so as to maintain a loose mulch of dry earth 2 to 3 inches deep and to destroy all weed growth. The ground was not reploughed before planting wheat, but when necessary it was freshened or loosened by cultivation.

Prior to 1908, the cultivation was done with a spring-tooth cultivator and harrow; since then the one-way disc cultivator has almost entirely taken the place of the former implement.

The above is an outline of the ploughing and cultivation that was given to each section since the commencement of these experiments in 1907. Of course, in Sections 2 and 3 the two series of blocks for each that were in use were worked in alternation, thus giving an experiment crop of wheat every year.

Planting the Wheat Crop.

Just prior to planting, each block was measured out and pickets were placed to indicate the position of the line. From 1907 to 1909 the line was run out by a hand-marker, and in 1910 and onwards by a marker on the drill, which the drill-wheel had to follow in sowing each plot. In F and G series the plots are 975 links long and 16 links wide, to allow of one drill width being sown. In B series the plots are 500 links long, and are 29·3 links wide to allow of two drill widths—*i.e.*, one round—being sown.

The seed for all the plots was then treated uniformly for the prevention of bunt (stinking smut) in the succeeding crop, with the fungicide calculated to give the most satisfactory results. The bluestone and lime-water treatment was used in 1907, 1908, and 1909, and the bluestone and salt treatment in 1910. The latter treatment has since been discontinued, and the former one was used again in 1911 and 1912.

The varieties of wheat sown in the different years were as follow :—

1907, Section 1, Bunyip; Sections 2 and 3, Comeback.

1908, 1909, 1910, 1911, and 1912, Bunyip was sown in every section.

The planting was uniform for all the plots, which were all sown at the same rate per acre, namely :—

1907, 42 lb. of Comeback, or 36 lb. of Bunyip.	1910, 36 lb. of Bunyip.
1908, 42 lb. of Bunyip.	1911, 42 lb. of „
1909, 42 lb. of „	1912, 57 lb. of „

They were also sown at the same regular depth, and at the same time—*i.e.*, on the same day, two successive days, or two days as close together as the weather would permit.

As it was desirable that all sections should be planted at the same time the planting never took place earlier than the middle of the planting season—the middle of May—in order to allow a reasonable time in which to properly prepare the land on which wheat was sown each year—Section 1.

Fertilisers.

As stated in the general directions above, each block is subdivided into eleven plots, composed of ten plots for comparative purposes, and one division for convenience in harvesting and cultivation. These plots were all manured in accordance with Sketch C. These fertilisers were applied to the wheat crops only—*i.e.*, directly with the wheat in each case; no fertiliser was applied to the cover crops where such were grown. The fertilisers were distributed evenly and uniformly on the plots. This was done by using a drill with a fertiliser attachment or distributor. To facilitate an even distribution, each fertiliser was increased in bulk by the addition of dry sand—a non-fertilising material—and also to such a bulk (found by actual trial) as would allow all the fertilisers to be sown by the same speed-gear or speed-rate of the fertiliser distributor.

After Cultivation.

The ground was harrowed after planting the seed to ensure proper covering of the seed, and to level the ground by filling in the drill wheel-marks. During its growth the crop was harrowed whenever sufficient rain fell to form a crust on the soil, and this practice was continued, if necessary, until the crop shaded the ground.

Harvesting.

The portions of the plots harvested for comparison were taken from the centre of each plot, the ends, which were likely to cause variations as the result of influences outside the plots, being cut off and rejected. The portions of the plots thus harvested for comparative purposes were reduced to such an area as would permit of easy computation, but they were not reduced more than was absolutely necessary to comply with this condition.

The crops on all the plots were stripped in a uniform manner.

Results.

The results of these experiments for the years of 1907 to 1912—*i.e.*, from the commencement of the experiments—are given in the tables that follow.

The "Natural" and "Percentage" yields were fully explained in the *Gazette* for February, 1911, under "Tillage Experiments with the Plough," on page 167.

TABLE showing methods of Manuring.
Experiments V and VII, 1907-1912.

Plot No.	1907-1910.	lb.	1911.	lb.	1912.*	lb.
1.	No manure	...	No manure	...	No manure	...
2.	Sulphate of ammonia	60	Dried blood	106	Dried blood (1910 sample).	51
	Superphosphate ...	90	Superphosphate ...	87	Superphosphate (1912 sample).	118
3.	Superphosphate ...	90	Superphosphate ...	87	Superphosphate (1912 sample).	118
4.	Sulphate of potash...	30	Sulphate of potash ...	30	Sulphate of potash (1910 sample).	14½
5.	No manure	...	No manure	...	No manure	...
6.	Sulphate of ammonia	60	Dried blood	106	Dried blood (1910 sample).	51
7.	Sulphate of ammonia	60	Dried blood	106	Dried blood (1910 and 1911 samples).	48·7
	Sulphate of potash...	30	Sulphate of potash ...	30	Sulphate of potash ...	14½
8.	Superphosphate ...	90	Superphosphate ..	87	Superphosphate (1912 sample).	118
	Sulphate of potash...	30	Sulphate of potash ...	30	Sulphate of potash (1910 sample).	14½
9.	Sulphate of ammonia	60	Dried blood	106	Dried blood (1910 sample).	51
	Superphosphate ...	90	Superphosphate ...	87	Superphosphate (1912 sample).	118
	Sulphate of potash ...	30	Sulphate of potash ...	30	Sulphate of potash (1910 sample).	14½
10.	No manure	...	No manure	...	No manure	...

* In 1911 the Experiments Supervision Committee fixed the amount of fertilising ingredients for future years as follows:—P_2O_5 20 lb., K_2O 7½ lb., and N 6 lb. The weight of manure used depends upon its analysis, it being calculated to give the quantities quoted per acre.

TABLE I.—CONTINUOUS WHEAT.

(*a*) Crop stripped and straw afterwards burnt.

Series G. Block IX. Variety, Bunyip.

Plot.	Yield.		1907.	1908.	1909.	1910.	1911.	1912.	Average.
1. (*check*)	Actual ...	bus.	22·0	18·7	33·3	20·5	7·1	13·5	19·2
2. ...	Actual ...	bus.	26·2	22·3	31·6	23·2	12·4	24·9	23·4
	Natural ...	,,	21·7	18·8	31·6	18·8	7·0	11·3	18·2
	Percentage ...	..	120·8	118·8	100·0	123·0	177·1	220·0	128·6
3. ...	Actual ...	bus.	26·2	21·2	31·6	24·5	12·3	17·3	22·2
	Natural ...	,,	21·3	18·8	29·8	17·2	6·9	9·2	17·2
	Percentage ...	...	122·6	112·5	106·0	142·8	177·0	188·3	129·0
4. ...	Actual ...	bus.	20·8	18·5	28·5	16·3	7·5	...	18·3
	Natural ...	,,	21·0	18·9	28·1	15·5	6·9	...	18·1
	Percentage ...	..	99·2	97·8	101·6	105·3	108·9	...	101·1
5. (*check*)	Actual ...	bus.	20·7	19·0	26·3	13·8	6·8	4·9	15·2
6. ...	Actual ...	bus.	19·8	16·9	26·3	14·8	4·8	2·6	14·2
	Natural ...	,,	20·6	19·1	26·2	14·0	6·6	5·3	15·3
	Percentage ...	...	96·3	88·5	100·5	105·9	72·8	49·1	92·8
7. ...	Actual ...	bus.	23·2	17·7	25·1	18·3	6·0	5·2	15·9
	Natural ...	,,	20·5	19·2	26·0	14·2	6·4	5·8	15·3
	Percentage ...	...	112·8	92·2	96·5	129·4	94·2	90·5	103 9
8. ...	Actual ...	bus	25·8	24·0	28·5	22·2	11·6	13·6	20·9
	Natural ...	,,	20·5	19·3	25·9	14·3	6·2	6·2	15·4
	Percentage ...	...	126·2	124·4	110·1	154·6	188·3	217·5	135·7
9. ..	Actual ...	bus.	25·3	24·0	28·7	25·3	10·7	20·0	22·3
	Natural ...	,,	20·4	19·4	25·7	14·5	5·9	6·7	15·4
	Percentage ...	...	124·2	123·7	111·5	174·7	179·6	298·9	144·8
10. (*check*)	Actual ...	bus.	20·3	19·5	25·6	14·6	5·7	7·1	15·5

TABLE I.—CONTINUOUS WHEAT.

(*b*) Crop stripped, and straw afterwards removed with reaper and binder.

Series G. Block X. Variety, Bunyip.

Plot.	Yield.		1907.	1908.	1909.	1910.	1911.	1912	Average.
1. (*check*)	Actual ...	bus.	17·8	19·9	20·2	7·8	2·7	5·5	12 3
2. ...	Actual ...	bus.	21·2	23·3	27·4	16·5	6 1	14 5	18 2
	Natural ...	,,	18·3	20·0	20·2	8·3	2·6	5 0	12·6
	Percentage ...	..	115 4	116·7	135·8	198·1	235·8	290·0	144·4
3. ...	Actual	bus	20·0	23 6	24·6	12·2	4·8	10·7	16·0
	Natural ...	,,	18·8	20 1	20·2	8·8	2·5	4·6	12·5
	Percentage ..	.	106·2	117·8	122·1	137·7	189·7	234·9	128·0
4. ..	Actual ...	bus.	19 3	19·9	22·1	8·0	2·7	5 0	12 8
	Natural ..	,,	19·3	20·1	20·1	9 3	2·5	4 1	12·6
	Percentage ...	..	100·0	98·9	109 8	85·7	108·1	122 0	101·6
5. (*check*)	Actual ...	bus.	19·8	20·2	20·1	9 8	2·4	3·6	12·7
6. ..	Actual ...	bus.	18·8	16·5	18·6	9·3	2·8	2·9	11·5
	Natural ...	,,	19 2	19 9	20 3	10·6	3·0	4·3	12·9
	Percentage ...	...	98·2	82·9	91·5	87·8	93·0	67·1	89·1
7. ...	Actual ..	bus.	18·7	16·3	22·1	11·0	3·7	1·9	12·3
	Natural ...	,,	18·5	19·6	20·5	11·4	3·6	5·1	13·1
	Percentage ...	..	100·7	83·2	107·6	96·2	102·8	37·5	93·9
8. ...	Actual ...	bus.	22 8	24·2	26 6	21·2	8·7	11·1	19·1
	Natural ...	,,	17·9	19·3	20·8	12·2	4·2	5·8	13·4
	Percentage ...	...	127·6	125·4	128·1	173·0	204·5	196·3	142·5
9. ...	Actual ...	bus.	22·7	23·8	31·3	22·8	12·7	12·1	20·9
	Natural ...	,,	17·3	19·0	21·0	13·0	4·9	6·3	13·6
	Percentage ...		131·4	125·3	149·2	175·2	260·2	191·2	153 7
10. (*check*)	Actual ...	bus.	16·6	18·7	21·2	13·8	5·5	7·0	13·8

TABLE I.—CONTINUOUS WHEAT.

(c) Crop stripped, and straw afterwards ploughed in.

Series G. Block XI. Variety, Bunyip.

Plot.	Yield.		1907	1908.	1909.	1910.	1911.	1912.	Average.
1. (*check*)	Actual ...	bus	16·3	17·2	25 5	13·5	5 9	5 0	13·9
2. ...	Actual ...	bus	22 0	22·0	31·6	23·3	11·6	18 8	21·5
	Natural ...	,,	16·5	17·3	23·8	13·3	5·2	4·5	13 4
	Percentage ..	.	133·7	127·2	132·9	175 0	278·6	418·6	160·4
3. ...	Actual ...	bus.	19·8	21·9	29·9	20·7	11·9	11·4	19·3
	Natural ...	,,	16 6	17·4	22·1	13·2	4·7	4·0	13·0
	Percentage ...	.	119 6	125·9	135·6	157·0	251·0	286·5	148·5
4. ..	Actual ...	bus	15·8	17·7	23·6	17·2	5·7	4·3	14·1
	Natural ...	,,	16 7	17·5	20·3	13·0	4·3	3·5	12·6
	Percentage ...	...	94·8	101·1	116 1	132 0	132·5	120 7	111·9
5. (*check*)	Actual ...	bus.	16·8	17·6	18·6	12·8	3 6	3·0	12·1
6. ...	Actual ...	bus.	20·7	16 3	18·8	13·8	3·3	3·1	12·7
	Natural ...	,,	16 9	17·5	19·7	13·3	4·3	3·7	12·6
	Percentage ...	...	122·4	93·2	95·3	103·7	77·1	84·4	100 8
7. ...	Actual ...	bus.	23·7	16·9	24·0	17·7	5·6	3·6	15·2
	Natural ...	,,	16·9	17·4	20·8	13·8	5·0	4·4	13·1
	Percentage ...	..	139 6	97·4	115·2	127·7	111·1	81·9	116·0
8. ..	Actual ...	bus.	25·8	24·7	30·4	22·0	13·3	11·2	21·2
	Natural ...	,,	17·0	17 2	22·0	14·3	5·8	5·1	13·6
	Percentage ...	..	151 9	143·3	138·4	153·5	231·4	221·3	155·8
9. ...	Actual ...	bus.	24·5	23·5	31·7	23·2	13·2	10·1	21·0
	Natural ..	,,	17·1	17·1	23·1	14·8	6·5	5·7	14·0
	Percentage ...	...	143·4	137·3	137·3	156·2	203·7	176·3	150·0
10. (*check*)	Actual ...	bus.	17·1	17·0	24·2	15·3	7·2	6·4	14·5

TABLE II.—WHEAT AFTER BARE FALLOW.

(a) Crop stripped, and straw afterwards burnt.

Variety—Comeback in 1907; Bunyip subsequently.

Plot.	Yield.		1907.	1908.	1909.	1910	1911.	1912.	Average.
1. (*check*)	Actual ...	bus.	33·7	17·1	35·9	23·7	16·8	21·8	24·8
2. ...	Actual ...	bus.	30·2	18·1	27·7	25·0	14·5	31·7	24·5
	Natural ...	,,	33·6	17·5	35·4	24·2	16·4	21·8	24·8
	Percentage ...	...	90·1	103·2	78·1	103·5	88·4	145·1	98·8
3. ...	Actual ...	bus.	30·0	18·0	31·9	26·2	18·5	26·4	25·2
	Natural ...	,,	33·4	18·0	35·0	24·7	16·0	21·8	24·8
	Percentage ...	..	89·9	100·0	91·1	106·1	115·3	120·9	101·6
4. ...	Actual ...	bus	32·0	16·7	35·9	25·3	14·4	...	24·9
	Natural ...	,,	33·2	18·5	34·6	25·2	15·7	...	25·4
	Percentage ...	...	96·4	90·6	103·9	100·7	94·9	...	98·0
5. (*check*)	Actual ...	bus.	33·0	18·9	34·1	25·7	15·3	21·9	24·8
6. ...	Actual ...	bus.	32·5	16·6	34·4	23·2	14·1	21·2	23·7
	Natural ...	,,	33·5	18·8	33·9	25·3	15·3	22·5	24·9
	Percentage ...	...	97·1	88·2	101·4	91·6	92·2	94·0	95·2
7. ...	Actual ...	bus.	33·4	15·9	36·6	22·8	13·7	22·5	24·1
	Natural ...	,,	33·9	18·7	33·7	24·9	15·3	23·1	24·9
	Percentage ...	...	98·3	84·8	108·5	91·6	89·6	97·2	96 8
8. ...	Actual ...	bus.	33·7	17·9	37·2	25·7	16·8	30·2	26·9
	Natural ...	,,	34·4	18·7	33·6	24·6	15·3	23·8	25·0
	Percentage ...	...	98·0	95·9	110·8	104·4	109·6	127·2	107·6
9. ...	Actual ...	bus.	31·5	16·3	29·9	25·5	15·5	28·6	24·5
	Natural ...	,,	34 9	18·6	33·4	24·2	15·3	24·4	25·1
	Percentage ..	...	90·3	87·7	89·6	105·4	100·9	117·2	97·6
10. (*check*)	Actual ...	bus.	35·4	18·5	33·2	23·8	15·3	25·0	25·2

TABLE II.—WHEAT AFTER BARE FALLOW.

(*b*) Crop stripped, and straw afterwards removed with reaper and binder.
Series and Blocks B VI and F X.

Variety—Comeback in 1907 ; Bunyip subsequently.

Plot.	Yield.		1907.	1908.	1909.	1910	1911.	1912.	Average.
1. (*check*)	Actual ...	bus.	34 6	18·7	35·4	22·2	15·6	22·0	24·7
2. ...	Actual ...	bus.	33·0	18·5	29 7	23·3	13·7	26·4	24·1
	Natural ...	,,	34·3	18·4	34·9	22·9	15·4	21·5	24·6
	Percentage ...	...	96 3	100 9	85·1	101·7	89·0	122·8	98·0
3. ..	Actual ...	bus.	31·7	17·3	28·1	26·3	16·8	23·8	24·0
	Natural ...	,,	34 0	18·0	34 4	23·7	15·3	21·0	24·4
	Percentage ...	.	93 4	96·1	81·7	110·9	110·1	113·3	98·3
4 ...	Actual ...	bus.	35·6	15·7	32·8	25·2	14·8	20·5	24·1
	Natural ...	,,	33·7	17·6	33·9	25·4	15·1	20·5	24·3
	Percentage ...	.	105 5	89·0	96·7	102·5	98·0	100·0	99·1
5. (*check*)	Actual ..	bus.	33 5	17·3	33·4	25·3	14·9	20·0	24·1
6. ..	Actual ...	bus.	35·8	16·3	35·4	24·7	13·6	19 3	24·2
	Natural ...	,,	33·9	17·6	33·6	24·7	15·8	19·6	24·2
	Percentage ...	...	105·7	92·6	105·3	100·0	93·2	98·5	100·0
7. ..	Actual ...	bus.	34·3	16·8	38·9	23·2	14·7	19·5	24·6
	Natural ...	,,	34·3	17·9	33·8	24·1	14·2	19·1	23·9
	Percentage ...	...	100 0	93·9	114·9	96·3	103·0	101·9	103·0
8. ...	Actual ...	bus.	36·6	20·1	34·7	25·8	15·9	29·1	27·0
	Natural ...	,,	34 7	18·2	34·1	23·4	13·9	18 7	23·8
	Percentage ...	..	105·3	110·4	101·9	110·2	114·2	155·2	113·4
9. ...	Actual ...	bus.	34·1	19·8	35·1	26·2	15·5	25·0	25·9
	Natural ...	,,	35·1	18·5	34·3	22·8	13·6	18·2	23·7
	Percentage ...	..	96·9	107·0	102·4	114·8	114·2	135·8	109·2
10. (*check*)	Actual ...	bus.	35·6	18·8	34·5	22·2	13 2	17·5	23·6

TABLE II.—WHEAT AFTER BARE FALLOW.

(*c*) Crop stripped, and straw afterwards ploughed in.

Series and Blocks B VII and F XI.

Variety—Comeback in 1907 ; Bunyip subsequently.

Plot.	Yield.		1907.	1908.	1909	1910.	1911.	1912	Average.
1. (*check*)	Actual ..	bus.	36·0	18·7	34·2	29·3	15·1	19·8	25·5
2. ..	Actual ...	bus	29·5	20·7	35·2	24·8	14·1	24·3	24·8
	Natural .	,,	35·1	19 1	34·0	28·2	14 8	19·3	25·1
	Percentage ..	...	84·1	108·7	103·6	88·2	95·7	125 7	98·8
3. ...	Actual ..	bus.	32·3	21 3	29 9	28·0	15·9	27·5	25·8
	Natural .	,	34·2	19·4	33·7	27·0	14·5	18 8	24·6
	Percentage ...	...	94·7	109·8	88·6	103·7	109·7	145·7	104·9
4. ...	Actual ...	bus.	30·7	20·4	34·3	25·2	15 2	19·5	24·2
	Natural ...	,,	33·3	19 7	33·5	25·8	14·2	18·4	24·1
	Percentage .	.	92·4	103·3	102·3	97·4	107·3	105·9	100·4
5. (*check*)	Actual ...	bus.	32 4	20·1	33·3	24·7	13·9	18·0	23·7
6. ...	Actual . .	bus	35·1	16·5	38·2	24·7	13 2	18·2	24·3
	Natural ...	,,	32·3	19·6	33·9	24·8	13·7	18·7	23·8
	Percentage ..	..	108 6	84·0	112·8	99 6	96·3	97·3	102·1
7. ...	Actual ...	bus	34·0	16·4	36 9	25·8	14·0	19 1	24·4
	Natural ...	,,	32 3	19 2	34·4	24·9	13·6	19 5	24·0
	Percentage ...	...	105·2	85·5	107·2	103·9	102 9	97 9	101·7
8 ...	Actual ...	bus.	31 9	21·7	37·1	24·8	16·1	29·6	26·9
	Natural ...	,,	32·3	18·7	35·0	25·0	13·4	20 2	24·1
	Percentage ...	..	98·7	115·9	103·1	99·5	120·1	146·8	111·2
9. ...	Actual ...	bus.	30·3	19·1	32·8	25·3	14·7	26·4	24·8
	Natural ...	,,	32·3	18 3	35 5	25·1	13·3	20·9	24·2
	Percentage ...	..	93 7	104·6	92·3	101·1	110·5	126·3	102·8
10. (*check*)	Actual ...	bus.	32·3	17·8	36·1	25·2	13·2	21·7	24·4

TABLE III.—WHEAT AFTER A FODDER CROP.

(*a*) Crop stripped, and straw afterwards burnt.

Series and Blocks B IV and F VIII.

Variety—Comeback in 1907 ; Bunyip subsequently.

Plot.	Yield.		1907	1908.	1909	1910.	1911.	1912.	Average
1. (*check*)	Actual ...	bus.	33·0	19·5	33·9	25·2	16·5	34·1	27·0
2. ...	Actual ...	bus	33·2	21·4	36·7	26·7	16·5	36·1	28·4
	Natural ..	,,	32·8	19·5	34·1	25·7	16·0	32·0	26·7
	Percentage .		101·2	109·5	107·8	103·7	103·3	117·8	106·4
3. ...	Actual .	bus	33·2	20·3	35·0	26·8	17·3	33·9	27·8
	Natural .	,,	32·7	19·6	34·2	26·2	15·5	30·0	26·4
	Percentage ...	.	101·7	103·6	102·3	102·2	112·1	113·1	105·3
4 ...	Actual ...	bus.	33·7	20·1	36·4	27·7	15·5	26·4	26·6
	Natural ..	,,	32·5	19·6	34·3	26·8	14·9	28·0	26·0
	Percentage ...	.	103·7	102·3	106·0	103·2	103·6	94·3	102·3
5 (*check*)	Actual .	bus	32·4	19·7	34·5	27·3	14·4	25·9	25·7
6. .	Actual ..	bus	33·2	18·3	36·6	26·2	15·9	24·5	25·8
	Natural ..	,,	33·1	19·4	34·9	26·8	14·6	25·9	25·7
	Percentage ...	.	100·5	94·3	104·7	97·5	108·8	94·6	100·4
7. .	Actual ...	bus	34·7	17·9	34·6	26·0	15·6	23·8	25·4
	Natural ..	,,	33·8	19·1	35·4	26·3	14·8	25·9	25·9
	Percentage .	.	102·9	93·7	97·8	98·7	105·6	91·9	98·1
8. .	Actual ..	bus.	33·2	19·2	34·6	26·0	16·4	34·1	27·2
	Natural ...	,,	34·5	18·8	35·8	25·8	15·0	25·8	26·0
	Percentage ...	..	96·4	102·1	96·6	100·7	109·6	132·1	104·6
9. ..	Actual ..	bus.	31·6	18·3	37·4	25·5	17·4	34·3	27·9
	Natural .	,,	35·2	18·5	36·3	25·3	15·1	25·8	26·0
	Percentage ..	.	98·4	98·9	103·1	100·7	115·4	132·9	107·3
10. (*check*)	Actual ...	bus.	35·9	18·2	36·7	24·8	15·3	25·8	26·1

TABLE III.—WHEAT AFTER A FODDER CROP.

(*b*) Crop stripped, and straw afterwards removed with reaper and binder.

Series and Blocks B II and G VIII.

Variety—Comeback in 1907; Bunyip subsequently.

Plot.	Yield.		1907	1908.	1909.	1910.	1911	1912.	Average.
1. (*check*)	Actual ...	bus.	29·0	16·0	28·4	29·2	12·5	34·1	24·9
2. ..	Actual ...	bus	32 3	20·1	35·0	28·3	17·6	36·1	28·2
	Natural ...	,,	29·4	16·6	29·1	28·2	12·4	32·0	24·6
	Percentage ...	..	109 8	121·4	120·5	100·5	114·7	117·8	114·6
3. ...	Actual ..	bus	34·9	19·4	36·0	29·2	17·9	33·9	28·5
	Natural ...	,,	29·8	17·1	29·7	27·2	12·4	30·0	24·4
	Percentage ...	..	117 1	113·2	121·2	107·1	114·5	113·1	116·8
4. ...	Actual ...	bus	31·2	19·3	33·6	27·3	15·6	26·4	25·6
	Natural ..	,,	30·2	17·7	30 3	26·3	12·3	28·0	24·1
	Percentage ...	...	103 2	108·9	110·7	104·0	126·6	94·5	106·2
5. (*check*)	Actual ..	bus	30·7	18·3	31·0	25·3	12·3	25·9	23 9
6. ...	Actual ..	bus.	31·1	18·6	33·7	26·0	15·1	24·5	24·8
	Natural ...	,,	30·9	18·7	31·3	25·6	12·8	25·3	24·1
	Percentage ...	...	100·6	99·5	107·5	101·4	118·0	97·1	102·9
7. ...	Actual ...	bus	31·1	18 7	34·5	26·0	13·7	23·8	24·6
	Natural ...	,,	31 0	19 1	31·7	25·9	13·3	24·6	24·3
	Percentage ...	..	100·1	97·9	108·9	100 3	103·1	96·7	101·2
8. ...	Actual ...	bus.	34·0	22·5	34·3	29·0	16 8	36·3	28·8
	Natural ...	,,	31·2	19·5	32·0	26·2	13·8	23·9	24·4
	Percentage ...	...	108·9	97·9	107·0	110·6	121·9	152·0	118 0
9. ...	Actual ...	bus.	31·6	21·1	33·2	27·5	15·5	37·4	27·7
	Natural ...	,,	31·4	19·9	32·4	26·5	14·3	23·2	24·6
	Percentage ...	.	100·7	106·0	102·6	103·7	108·2	161·2	112·6
10. (*check*)	Actual ..	bus.	31·6	20·3	32·7	26·8	14·8	22·5	24·8

TABLE III.—WHEAT AFTER A FODDER CROP.

(*c*) Crop stripped, and straw afterwards ploughed in.

Series and Blocks B III and F VII.

Variety—Comeback in 1907; Bunyip subsequently.

Plot.	Yield.	1907.	1908.	1909.	1910.	1911.	1912.	Average
1. (*check*)	Actual ... bus.	32·6	17·7	33·0	24·0	14·4	29·2	25·1
2. ...	Actual ... bus.	30·4	22·3	27·6	23·5	16·8	32·4	25·5
	Natural .. ,,	32·5	18·3	32·8	24 5	14·4	28·6	25·2
	Percentage	93·4	121·6	84·0	95·9	116·7	111·1	101·2
3. ...	Actual ... bus.	32·6	22·0	30 1	24·7	17·2	34·7	26·9
	Natural ... ,,	32·4	19·0	32·7	25·0	14·4	28·1	25·3
	Percentage	100 6	115·8	92·0	98·6	119·4	123·4	106·3
4. ...	Actual ... bus.	32·2	21·4	31·7	26·5	15·1	28·9	26·0
	Natural ... ,,	32·3	19·6	32·5	25·5	14·4	27·5	25·3
	Percentage	102·8	108·9	97·4	103·9	104·6	104·8	102·8
5. (*check*)	Actual ... bus.	32·2	20·3	32·4	26·0	14·4	27·0	25·4
6. ...	Actual ... bus.	31·9	19·7	30·6	27·0	14·4	25·4	24·8
	Natural .. ,,	32·9	20·4	32·6	25·8	14·6	27·0	25·6
	Percentage	96·9	96·7	94·0	104·8	98·9	93·9	96·9
7. ...	Actual ... bus.	31·5	19·7	34·1	27·0	14·3	28·4	25·8
	Natural ... ,,	33·5	20·5	32·7	25·5	14·7	27·1	25·7
	Percentage	94·0	96·3	104·2	105·7	96·9	105·0	100·4
8. ...	Actual ... bus.	34·1	22·0	36·6	28·7	18·5	34·9	29·1
	Natural ... ,,	34·1	20·5	32·9	25·3	14·9	27·1	25·8
	Percentage	100·0	107·1	111·3	113·3	124·5	128·7	112·8
9. ...	Actual ... bus.	34·6	20·8	37·2	25·2	16·3	32·9	27·8
	Natural ... ,,	34·7	20·6	33·0	25·1	15·0	27·1	25·9
	Percentage	99·7	100·9	112·6	100·4	108·2	121·3	107·3
10. (*check*)	Actual ... bus.	35·4	20·7	33·2	24·8	15·2	27·2	26·1

Tables I, II, and III give the results obtained from each individual plot during the progress of these experiments. It will be noticed that Table I gives the yields obtained from Section 1, or wheat every year on the same land; Table II, the yields from Section 3, or wheat in alternate years on the same land, the land in other years being bare fallowed; and Table III, the yields from Section 2, or wheat in alternate years on the same land, a fodder crop being grown in other years. Each table is then divided into three sub-tables (*a*), (*b*), and (*c*), representing different methods of harvesting, in which (*a*) represents the crop stripped and straw burnt off; (*b*) the crop stripped and straw afterwards removed with reaper and binder; and (*c*) the crop stripped and straw afterwards ploughed in. Each of these sub-tables gives the yields from seven plots manured with either sulphate of ammonia or dried blood, which supply nitrogen; sulphate of potash, which supplies potash; or superphosphate, which supplies phosphoric acid, either singly or in combination. These are compared with the yields of three plots not manured at all.

In order to illustrate more clearly the results obtainable from the different conditions under which wheat is grown, the different methods of harvesting practised, and the various fertilisers used, Tables IV, V, and VI have been prepared. Each of these tables is a summary prepared from Tables I, II, and III.

Table IV shows the results obtained from the different methods of harvesting employed under each of the conditions of growing wheat.

	Average Yield in Bushels
Table IV (*a*).—Wheat every Year.	
(1) Straw burnt	18·7
(2) Straw ploughed in	16·6
(3) Straw removed with reaper and binder	15·0
Table IV (*b*).—Wheat in alternation with Bare Fallow.	
(1) Straw ploughed in	24·9
(2) Straw burnt	24·9
(3) Straw removed with reaper and binder	24·6
Table IV (*c*).—Wheat in alternation with Fodder Crops.	
(1) Straw burnt	26·8
(2) Straw removed with reaper and binder	26·3
(3) Straw ploughed in	26·2

Summarising the three main classes:—

Wheat every year averaged ...	... 16·8	bushels per acre.
Wheat after bare fallow averaged	... 24·8	„
Wheat after fodder crop averaged	... 26·4	„

With wheat each year there is a marked advantage in the practice of burning the straw by the results shown. The practice of burning stubble is fairly general with farmers, and where they follow wheat on wheat the

practice is a correct one. How long, however, crops may be grown continuously with similar soils and conditions as those at Cowra, with equal yields, and whether stubble-burning will continue the best practice, has still to be solved.

Wheat alternating with bare fallow.—There is but slight difference between any of the sections. It may be said, therefore, that for the six years—three of which the land is cropped for wheat and three bare fallowed—the method of disposal of the straw has little or no influence on the yield. It is worthy of note that wheat after bare fallow averaged 8 bushels per acre more than the continuous wheat.

In the wheat after fodder crop section the results indicate that there is a sufficiency of organic matter supplied by ploughing in the fodder crop prior to cropping with wheat, and thus there is not a marked difference between the results. It is worthy of note that approximately 1½ bushels more wheat per acre is obtained by this system than the best return wheat after bare fallow. This season a test is being made of feeding-off a portion of the rape in the experiment for comparison purposes.

Table V illustrates the results obtained under the different conditions of growing wheat, and is divided into three sub-tables—(*a*), (*b*), and (*c*)—referring to the different methods of harvesting.

Taking the "Average yield in bushels" as a basis for comparison, it will be seen that the results obtained from the different conditions under which wheat is grown, are as follow:—

	Average Yield in Bushels.	Average Yield.
Table V (*a*).—Straw burnt.		
(1) Wheat after a fodder crop	26·8	23·5
(2) Wheat after bare fallow	24·9	
(3) Wheat every year	18·7	
Table V (*b*).—Straw ploughed in.		
(1) Wheat after a fodder crop	26·2	22·6
(2) Wheat after bare fallow	24·9	
(3) Wheat every year	16·6	
Table V (*c*).—Straw removed with reaper and binder.		
(1) Wheat after a fodder crop	26·3	22·0
(2) Wheat after bare fallow	24·6	
(3) Wheat every year	15·0	

Table VI shows clearly the effects of the different fertilisers under each condition of growing wheat. The average yield of the three plots, one for each of the methods of harvesting practised, which are manured with the same fertiliser under each condition of growing wheat, has been given in the Table as the result from the fertiliser.

TABLE VI.—FERTILISER TRIALS, showing the actual yields obtained from the use of fertilisers.

(*a*) Wheat every year.

No.	Manure used.	1907.	1908.	1909	1910.	1911.	1912.	Average.	Percentage.
1. (*check*)	No manure	18·7	18·6	26·3	13·9	5·2	8·0	15·1	100·0
2. ..	Nitrogen, phosphoric acid...	23·1	22·5	30·2	21·0	10·0	19·4	21·0	142·9
3. ...	Phosphoric acid	22·0	22·2	28·7	19·1	9·7	13·1	19·1	134·5
4. ...	Potash	18·6	18·7	24·7	13·8	5·3	4·7	14·3	103·7
5. (*check*)	No manure	19·1	18·9	21·7	12·1	4·3	3·8	13·3	100·0
6. ...	Nitrogen	19·8	16·6	21·2	12·6	3·6	2·9	12·8	94·1
7. ...	Nitrogen, potash .. .	21·9	17·0	23·7	15·7	5·3	3·6	14·5	105·1
8. ...	Phosphoric acid, potash ...	24·8	24·3	28·5	21·8	11·2	12·0	20·4	145·7
9. ..	Nitrogen, phosphoric acid, potash.	24·2	23·8	30·6	22·8	12·2	14·1	21·4	149·8
10. (*check*)	No manure	18·0	18·4	23·7	14·6	6·1	6·8	14·6	100·0

(*b*) Wheat after Bare Fallow.

No.	Manure used.	1907.	1908	1909.	1910.	1911.	1912.	Average.	Percentage.
1. (*check*)	No manure	34·8	19·2	35·2	25·1	15·8	21·2	25·1	100·0
2. ...	Nitrogen, phosphoric acid...	30·9	19·1	30·9	24·4	14·1	27·5	24·5	98·2
3. ...	Phosphoric acid	31·3	18·9	30·0	26·8	17·1	25·9	25·0	102·0
4. ..	Potash	32·8	17·6	34·3	25·2	14·8	20·0	24·1	99·2
5. (*check*)	No manure	33·0	18·8	33·6	25·2	14·7	20·0	24·2	100·0
6. ..	Nitrogen	34·5	16·5	36·0	24·2	13·6	19·6	24·1	99·5
7. ..	Nitrogen, potash	33·9	16·4	37·5	23·9	14·1	20·4	24·4	100·4
8. ...	Phosphoric acid, potash ...	34·1	19·9	36·3	25·4	16·3	29·6	26·9	110·7
9. ...	Nitrogen, phosphoric acid, potash.	32·0	18·4	32·6	25·7	15·2	26·7	25·1	102·9
10. (*check*)	No manure	34·4	18·4	34·6	23·7	13·9	21·4	24·4	100·0

TABLE VI.—FERTILISER TRIALS—*continued.*

(c) Wheat after Fodder Crop.

No.	Manure used.	1907.	1908.	1909.	1910.	1911	1912.	Average	Percentage.
1. (*check*)	No manure	31·5	17·7	31·8	26·1	13·5	32·5	25·7	100 0
2. ...	Nitrogen, phosphoric acid...	32·0	21·3	33·1	26·2	17·0	34·9	27·4	107·4
3. ...	Phosphoric acid	33·6	20·6	33·7	26·9	17·5	34·2	27·7	109·5
4. ..	Potash	32·4	20 3	33·9	27·2	15·4	27·2	26 1	104·0
5. (*check*)	No manure	31·8	19·8	32·6	26·2	13·7	26·2	25·0	100 0
6. ..	Nitrogen	32·1	18·9	33·6	26·4	15·1	24·8	25·1	100 0
7. ...	Nitrogen, potash	32·4	18·8	34·4	26·3	15·2	25·3	25 4	100·8
8. ...	Phosphoric acid, potash ..	33·8	21·2	35·2	27·9	17·2	35·1	28·4	111·8
9. ...	Nitrogen, phosphoric acid, potash.	33 6	20·1	35·9	26·1	16·4	34·9	27·8	108·6
10. (*check*)	No manure	34·3	19·7	34·1	25·5	15·1	25·2	25·7	100·0

In Table VI the yields of the three sections, in which the straw is burnt, removed, and ploughed in, respectively, are averaged, and the result stated under each manure. This generalisation cannot therefore show the effects, chemical and mechanical, caused by the presence or absence of straw in combination with the several manures and the result from their combined action. For this information reference may be made to Tables I, II, and III, and to an article on continuous wheat culture published in the *Agricultural Gazette* for May, 1913.

In the continuous wheat section the application of manure is shown to be most beneficial, its relative value increasing as the yield from the unmanured portion decreases. The best return is obtained from the complete manure, followed closely by the combination of phosphoric acid with potash, and of phosphoric acid with nitrogen. Superphosphate alone gives a substantial increase of one-third over the six years of the test, while the results from potash alone, and in conjunction with nitrogen, are slight. The use of nitrogen has resulted in a return lower than that of the check plots.

In the "Wheat after Bare Fallow" section, the increases throughout are slight, the best return being given by phosphoric acid and potash, followed,

a long way after, by the complete manure. Superphosphate alone has a slight influence for good, while potash and nitrogen alone both yield lower returns than the unmanured portion.

In the "Wheat after Fodder Crop," the best returns are also given by phosphoric acid and potash, followed closely by phosphoric acid alone and the complete manure. Nitrogen, in combination with phosphoric acid, is also of considerable benefit, while the effects of the others may be considered negligible.

Placing the manures in order of merit under the three methods of growing wheat, and using N to represent nitrogen, P, phosphoric acid, and K, the potash, the position will be as follows :—

Order of Merit.	Continuous Wheat.		Bare Fallow.		Fodder Crop.	
	Manure.	Per-centage.	Manure.	Per-centage.	Manure.	Per-centage.
1.	N.P.K.	149·8	P.K.	110·7	P.K.	111·8
2.	P K.	145·7	N.P.K.	102 9	P.	109·5
3.	N.P.	142·9	P.	102·0	N.P.K.	108·6
4.	P.	134·5	N.K.	100·4	N.P.	107 4
5.	N.K.	105 1	*Checks.*	100·0	K.	104·0
6.	K.	103 7	N.	99·5	N.K.	100·8
7.	*Checks*	100·0	K.	99·2	N and *checks.*	100·0
8.	N.	94·1	N.P.	98·2		

It is significant that with one exception the first four places in each section contain phosphoric acid in the form of superphosphate, and among these is the ingredient used alone. Nitrogen alone in two cases out of the three is below the unmanured section, and in the third is on the same level

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Dorset Horn Sheep in Australia.

H. S. MAJOR, Assistant to the Sheep and Wool Expert.

Origin of the Breed.

LIKE most of the domesticated breeds of sheep which are popular at the present time, the exact origin of the Dorset Horn is unknown. It is claimed that the breed is absolutely pure, and its history dates back for several centuries.

In "Modern Sheep: Breeds and Management," by "Shepherd Boy," appears the following:—"The Dorset Horn is one of the oldest of the English mutton breeds. As its name implies, it originated in Dorsetshire a very long time ago—some writers claiming 2,000 years. This breed is also found in large numbers in the adjoining county of Somersetshire, where it is highly esteemed as an early lamb raiser, and to it the Christmas and Easter 'hot-house' lamb markets owe much for the wonderful quality which it supplies."

Pure Dorset Horn Lambs.

Points of the Dorset Horn Ram.

The adult ram is very massive in build, and the bone throughout is heavy. The head is large, and shows great depth of jaw and breadth across the nose and muzzle. The horns are very massive, deeply corrugated, and turn spirally outwards. The ewes possess very small horns, half-moon in shape. The lips are unusually thick, and the ears, muzzle, and skins very pink in colour. There is a striking likeness between the head of a Dorset ram and that of a clean-faced Merino ram, which would suggest some remote connection between these two breeds.

The chest of the Dorset is very wide and deep; the brisket is prominent and fleshy, and forces the front legs and shoulders very wide apart, thus

giving the animal great thickness "through the heart." In this latter respect the breed has few equals. The wither is well formed and flat; the top and bottom lines resemble those of the Romney Marsh.

The rump is well rounded; and on the limbs, both fore and hind, the flesh is carried well down to the knees and hocks. The feet are strong and large; the hoofs are of a clear honey colour. The face and lower limbs are covered with short white hairs.

The Wool.

In keeping with its early development and propensity to fatten, the Dorset is a poor wool producer, and the best feature of its fleece is its pure white colour when washed. The body wool of Southdowns and Shropshires is a dull white in comparison, and the black points are a source of trouble to the fellmonger and wool-sorter. The Dorset ram cuts a fleece weighing between

Dorset Horn Lambs.

7 and 9 lb., and is very lightly covered on the head, belly, and legs. In texture the wool resembles that of the black-faced Down breeds. It is short, harsh in handle, and deficient in character. Its quality would vary between 50's and 56's counts.

General Characteristics of the Breed.

The Dorset Horn is essentially a mutton breed, and should always be farmed as such.

It readily adapts itself to the various conditions of climate and pasture. The breed possesses many points in common with both the British Longwool and Down breeds. It is probably the quickest maturing sheep in the world. As two tooths the Dorsets are very attractive-looking sheep, but they lose their good appearance more rapidly than most breeds; nevertheless, they retain their vitality, and the rams are very prepotent. The ewes are good milk-producers, and can mother twins with ease.

The Flock at the Wagga Experiment Farm.

The breed was first tried by the Manager, Mr. McKeown, at Wagga as far back as 1902, but the present flock of pure-bred stock was not formed till 1910, when the Department purchased 18 ewes and 5 rams at the dispersal sale of the stock of Mr. Norman Brookman, Glenthorne Stud, South Australia. These sheep were of two strains, and were the progeny of high-class English importations.

At that time it was the Department's chief intention to establish this flock at Wagga Farm for the purpose of supplying rams for the cross-breeding experiments then inaugurated. As regards the merits of this breed, within certain limits they have exceeded all expectations, and it is only on account of their scarcity in Australia that their intrinsic value is not generally known.

Dorset Horn Ewes.

At the Wisconsin Agricultural College, U.S.A., tests with different mutton crosses have been carried out over a number of years, and the progeny of the Dorset Horn rams have proved their superiority over all other breeds employed. Americans refer to the Dorset ewes as milk and dairy sheep, and the lambs are termed "hot-house," so rapid is their development.

From the experience gained of the breed at the Wagga Farm we are able to endorse these opinions.

At the Wagga Farm all the lambs are ear tagged, so that individual records can be carefully kept. In 1912 the Farm had only 70 points of rain between January and June. There was no grass, and all stock had to be hand-fed on a mere sustenance diet. The little pure Dorset Horn flock of 27 ewes dropped 30 lambs, and reared 111 per cent. At the age of 3 months the whole lot averaged 67 lb. live weight, and at 5 months the average was 88 lb. Seven of the best ram lambs averaged 107 lb. at this time. This year 36 ewes were mated, and lambing took place under the favourable conditions of a good season. Four ewes missed, and to the remaining 32 ewes (many of which were maidens) 47 lambs were born. Of this number, no fewer than

30 lambs were twins. Forty-four lambs were marked, making a percentage of 122 on the number of ewes mated. A couple of lambs have since died from misadventure.

On the 14th of August this year, when the lambs were approximately 14 weeks old, 23 ram lambs averaged 88 lb. live weight, and 16 ewe lambs 75½ lb.; on 9th September, when the lambs were 17 weeks old, they averaged 100 lb. and 90½ lb. respectively. Two days later these lambs were shorn, and cut 2¼ lb. of very dry wool.

Dorset Horn Ram Lambs.

Below are appended the exact live body weights of the lambs on the two dates mentioned; and, as the weights are in the same order on both dates, individual increases can be followed:—

RAM LAMBS

14th August.	9th September.	14th August.	9th September.
60 lb.	80 lb.	87 lb.	108 lb.
93 ,,	112 ,,	77 ,,	91 ,,
79 ,,	93 ,,	94 ,,	112 ,,
86 ,,	101 ,,	74 ,,	92 ,,
82 ,,	95 ,,	82 ,,	97 ,,
78 ,,	94 ,,	84 ,,	104 ,,
74 ,,	90 ,,	86 ,,	107 ,,
101 ,,	115 ,,	68 ,,	81 ,,
91 ,,	113 ,,	90 ,,	108 ,,
62 ,,	78 ,,	67 ,,	84 ,,
110 ,,	131 ,,	74 ,,	92 ,,
85 ,,	105 ,,		

EWE LAMBS.

14th August.	9th September.	14th August.	9th September.
67 lb.	81 lb.	88 lb.	102 lb.
75 ,,	92 ,,	68 ,,	82 ,,
82 ,,	96 ,,	77 ,,	93 ,,
65 ,,	81 ,,	85 ,,	100 ,,
74 ,,	88 ,,	77 ,,	92 ,,
80 ,,	88 ,,	74 ,,	85 ,,
78 ,,	92 ,,	59 ,,	73 ,,
78 ,,	99 ,,	84 ,,	104 ,,

Three lambs which were dropped very late are omitted from this list. It will be noticed that one ram lamb scaled 131 lb. on 9th September. The first Dorset lamb at the Wagga Farm was noticed on 20th April, and assuming that this heaviest lamb was the first dropped, it could not possibly have been more than 4 months and 19 days old.

It also will be seen that in the short time of twenty-six days many of the lambs gained 20 lb. and over in body weight. One would expect this in pigs, but hardly in sheep. These facts, bearing evidence of the wonderful early-maturing qualities of the pure Dorset Horn, are all the more convincing in that, from birth up to this last weighing, the flock was depastured on natural pastures only.

The lambs do not retain this rate of increase in weight over the last half of their first year. Adult rams bred from the Wagga Farm flock weigh between 200 lb. and 230 lb. in good but not over-fat condition. Thus the lambs at 4½ months weigh half as much as they will be when fully developed.

The Dorset Horn Cross for Early Lambs.

No less than twelve different cross breeds are being tested for lamb-raising (among other things) at the Government Experiment Farms. On every occasion at the sale of these lambs of approximately the same ages, the progeny of the Dorset Horn rams and first-cross ewes have brought top prices, both in the London and Sydney markets. Though the Dorset Horn crosses lack the finer quality of the Southdown-cross carcases, this deficiency is more than compensated for by the greater live and dressed weights of the former crosses. In lamb-raising the time in which lambs take to reach a marketable condition is all-important to the farmer; at the same time, quality must not altogether be sacrificed. Recently a consignment of suckers from the Wagga Experiment Farm, representing twelve different cross breeds, were forwarded to Sydney for sale. They were penned separately, and offered in lots according to the breeding. The Dorset Horn-Border Leicester-Merino crosses topped the market at 17s. 11d. Full particulars of a shipment of lambs to London will be found in the *Agricultural Gazette* for March, 1912.

As a breed suitable for lamb raising, when correctly crossed, the Dorset Horn promises to fill a very important position in this profitable industry, which in Australia has hardly begun.

Recently Mr. Foorde, of "Montrose," Tarago, New South Wales, communicated with this branch of the Department, and a few extracts from his letter will interest prospective lamb raisers. *Inter alia*, Mr. Foorde says:—"I have now been using Dorset Horn rams for two seasons. Last year I used Lincoln rams and Dorsets, and found the Dorset-cross lambs a long way ahead of the Lincoln cross. This year 8 Dorset Horn and 6 Shropshire rams were joined with 700 cross-bred ewes, on the 14th January; but they did not start to work for about fourteen days later, as it was very dry here. When the lambs came, in the first 200 I don't think there were 20 Shropshire-cross lambs. I only have 1,000 acres of land, and have been running on it

1,000 grown sheep, besides cattle and horses I spoke of the Dorset Horn ten years ago for producing fat lambs, as I was born in Somersetshire, England, and can remember them all my life."

Mr. Foorde's first consignment of this season's lambs recently arrived in Sydney, and were sold in the open market at the Homebush Yards on 12th November. The following are the prices realised:—

56	lambs @	16s. 10d. to 17s. 1d.
111	"	15s. 2d. to 15s. 7d.
43	"	14s. to 14s. 1d.

The whole consignment of 210, all of which were suckers, averaged 15s. 5d. All these lambs were the progeny of Dorset Horn rams and Longwool-Merino ewes, and are the lambs referred to in the letter quoted above.

Diseased Tomatoes.

An inquirer asked for the best spray in connection with "Black Spot" in tomatoes. In reply, Mr. G. P. Darnell-Smith, Biologist of the Department, stated that there is little doubt but that bacteria are the primary cause of this disease, and that the presence of fungi (usually *Macrosporium tomato*) is secondary; hence spraying the fruit after the spot has appeared is not, as a rule, of much use. Bordeaux mixture (6–4–50) should be sprayed on the plants immediately the blossoms have fallen.

Observations point to the conclusion that most of the infection occurs through fissures near the base of the style. Fissures and irregular cell formations are very common on tomatoes at this point, and when the styles fall off a more or less rough scar often remains, which favours infection. This probably accounts for the fact that—

(*a*) Some varieties of tomato are more free from Black Spot than others.

(*b*) The reports of the results of spraying experiments are often contradictory.

An irregular and intermittent water supply favours the development of the disease in question, while constant watering with sufficient water to reach the deeper roots is a preventive.

Exposure to too much bright sunlight also favours the development of Black Spot; whereas artificial shading of the plants, allowing them to develop sufficient foliage to shade the fruit, or even planting them closer together than usual, tends to prevent the disease.

The use of a large amount of nitrate of soda as fertiliser has a tendency to make the tomatoes susceptible to Black Spot.

Discing Stubble Land before Ploughing.

H. C. STENING, Inspector of Agriculture.

THE aim of the wheat-grower in districts of limited rainfall should be to endeavour to collect and conserve in the soil as much as possible of the rain that falls throughout the year, in order to supplement the rainfall during the period of growth of the subsequent crop. This is the main object of fallowing; but our present method of fallowing allows of a period of the year in which no attempt is made to store up moisture, viz., from harvest time to the time of early fallowing in the month of June or July. After harvest, the soil, owing to its hard crusted surface, is in a very favourable condition to part with its moisture, and the great evaporating agencies—heat, dryness, and winds—are actively at work. But if the surface of the soil can be loosened, and a soil mulch formed, this evaporation can be checked, and any surplus moisture left in the lower soil over and above the needs of the preceding crop may be saved, and the soil at the same time prepared to receive the autumn rains, instead of allowing them to run off the hard surface or become rapidly absorbed by the hot, dry air.

Since water is the limiting factor of crop production in dry districts, the more moisture that is stored in the soil, other conditions being equal, the larger will be the returns. Therefore, the farmer who can thus start the year's "soil moisture account" with a "balance brought forward" and increased "deposits" in the early part of the year should make additional profits which will much more than recompense him for the extra labour and time expended, and in a dry season this additional moisture conserved may make all the difference between crop success and failure.

The soil at harvest time is usually not in a suitable condition for ploughing, owing to its hard, dry state, nor is it advisable to plough at this time, as the work can be performed more economically and quickly with a disc-cultivator. The land may then be ploughed at the usual time during winter or early spring. The disc-cultivator will cut into the hard surface soil, creating a loose, dry mulch, which will arrest further evaporation and enable the autumn rains to penetrate the subsoil.

This early discing before ploughing does more than aid the conservation of moisture, and has also much to recommend it to farmers in the more favoured wheat districts, especially where it is the intention to sow wheat again the following season:—

1. It chops up the stubble so that it can be more readily ploughed under, thus adding valuable organic matter to the soil, and returning to the soil the plant-food it has removed in its growth. It is necessary, however, that stubble should be ploughed under *early,* in order to allow of its thorough

decomposition before seeding operations begin, as dry straw decays slowly, and unless thoroughly decomposed it leaves the soil too open, causing a tendency for the soil to dry out readily.

2. It puts the soil into a condition conducive to the germination and growth of all weed seeds that are at or near the surface, which growth will be destroyed by the subsequent ploughing.

3. The soil is in a suitable condition for ploughing at any time. In the event of a dry spell, the operation of ploughing is rendered more easy, and the soil breaks up in much better condition.

4. It cultivates and pulverises that portion of the soil which, when the land is ploughed, will be deposited at the bottom of the furrow. One of the principles for conserving moisture is that the sub-surface soil should be finely pulverised and firmly compacted, thus increasing its water-holding capacity. It also increases its capillary attraction and places it in the best possible physical condition for the germination of the seed and the development of plant roots. The root-hairs of plants feed on the outside of the small particles of soil. Therefore, if the sub-surface soil is cloddy, the plant food is "locked up" in lumps, and the feeding area of the plant is reduced. Thus, pulverising the soil may be the equivalent of fertilising it. If for this reason alone, the early discing of the soil before ploughing is a practice that it would be well for the farmer to adopt.

Wheat Experiment Plots, Wagga Experiment Farm

Wagga Growing-Crop Competition, 1913.

[The Murrumbidgee Pastoral and Agricultural Association arranged a growing-crop competition this year on similar lines to that of last year, and with the approval of the Minister, Mr. H. C. Stening, Inspector of Agriculture for the district, acted as judge. The following extracts from the report furnished to the Association by Mr. Stening, are published for general information The table showing the methods adopted, and the marks received is included to show how universal among the leading farmers of the district are the methods recommended by the Department. The popularity of Federation wheat, to which reference is made by the adjudicator, can also be easily seen by a reference to this table.—Ed.]

Of the twenty-four entries for the Best Farm of Growing Crops, one was subsequently withdrawn, owing to the deterioration of the crop under the influence of the hot weather experienced during the early part of October. Judging was commenced on 23rd October, and completed on 3rd November, a delay of two days being occasioned by rain. The total area of crops inspected was 10,075 acres, ranging from 200 to 900 acres. After very careful examination points were allotted, according to the scale adopted by the Association, with the result that the following are the prize-winners :—

Best Farm of Growing Crops.

E. Field	...	... 156 points	... 1st prize	... £15 0 0
A. Wooden	...	... 152 ,,	... 2nd ,,	... 7 10 0
Powell Bros.	...	... 150 ,,	... 3rd ,,	... 3 0 0

Best 100 Acres of Wheat, to be Harvested for Grain, and to be Grown on Fallowed Land.

E. Field	...	... 155 points	... 1st prize	... £7 7 0
A. Alleyn	...	... 153 ,,	... 2nd ,,	... 2 2 0
A. Lewington...		... 151 ,,	... 3rd ,,	... 1 1 0

Best 100 Acres of Wheat grown for Hay.

H. M. Hutton	... ...	...	... 1st prize	... £5.

Mr. Field gains first prize in two sections by reason of the cultivation his land receives, making best use of the rain that falls prior to the sowing of the crop. The whole of his crop was grown on land fallowed during the winter months, and the surface kept loose from spring to seeding time by constantly cultivating with harrows or spring-tooth cultivator after every heavy rain, thus preventing the evaporation of the stored-up moisture. His average points were somewhat reduced on account of 80 acres sown by him on the halves, which did not score as well as the crop on his own farm.

It is significant that the whole of the crop of Mr. A. Wooden, the second prize-winner, should also have been grown on fallowed land. It was necessary to deduct points for cleanliness from this competitor, owing to the presence of black oats, which gained access to his farm by means of a wash from adjacent land.

Messrs. Powell Bros.' crops were grown mainly for hay, only 30 acres being Federation, but judged from a grain-yielding standpoint, gained sufficient points to secure third prize. All their land, two-thirds of which was fallowed, had been cropped for very many years.

I wish to make special mention of Mr. A. Hamilton's crops on Gobbagumbalin. Considering that his third crop land had to concede six points for cleanliness and six points for cultivation methods to older land, this competitor deserves great credit for running into fourth place, only one point behind the third prize-taker. On the whole, his were the best crops examined, being very even, clean, and estimated to average 28 bushels, all grown on well-worked fallow.

Wheat for Grain on Fallowed Land.

In the competition for the best 100 acres of wheat for grain, there were nineteen crops eligible to compete by reason of being on fallowed land. The fact that the three prizes in this section were won with Federation, indicates the popularity of this variety as a grain-producer. Not only on account of its consistency as a bag-filler is it so popular, but owing to its short strong straw and the fact that it holds its grain well. Large areas may be sown without much risk of loss by storms or delay during harvest time.

Wheat for Hay.

Mr. Hutton wins the only prize awarded for best 100 acres of wheat grown for hay with a very heavy crop of Zealand grown on land winter-fallowed and cultivated after rains. Messrs. Lyons Bros. and Messrs. Powell Bros., with an equal number of points, were runners-up to the winner, only two points behind, in each case with a crop of Zealand on fallowed land. This variety, in accounting for the first three places, shows how much it is in favour with hay-growers as a heavy yielder of best quality hay. Being a late-maturing variety, it is not considered very suitable for the grain grower, owing to the danger of haymaking clashing with stripping.

Firbank, of which some excellent crops were inspected, is more in favour with the grain-grower, for, owing to its earliness, he is enabled to harvest his hay and have it stacked before his grain crops are ready to harvest.

A few remarks under the separate heading for which points are awarded may be of interest.

Apparent Yield.

An examination of the ears of the wheat crops in the district this season will show that almost invariably the bottom four or five spikelets of the ears

are not formed, and that with very few exceptions there are no more than two grains per spikelet. This, no doubt, is the result of the dry conditions prevailing during July and August, and must militate against any exceptionally heavy yields. The recent opportune rains, however, should serve to swell the ears and result in plump grain, which should in some measure compensate for the deficiency of grains in the ears.

On the whole, the crops should average well, but the majority of competitors had some poor crops to reduce their average. Some of these were crops grown on unfallowed land or on rich flats that had suffered under the influence of the hot weather experienced during the early part of October, but the major portion of the poor crop was the result of late sowing. Most of the crop sown after the middle of May this season resulted in imperfect germination, but, in spite of the warning constantly reiterated against very late sowing, some growers continued to sow well into July and even August, with the result that the crop is extremely thin and the growth very backward, and was only rescued from total failure by the recent rains. To be on the safe side, farmers in this district should endeavour to complete their sowing by the first week in June. Acting on the experience of the present season, some farmers, who usually make a seasonable sowing, have resolved to advance their sowing period in future a week earlier.

The season was apparently very favourable to oat crops, for almost every crop of this cereal examined was carrying a heavy yield of grain.

Type.

Although there were a few crops pure to type, the majority were not as true to type as could have been wished for. This trouble arises from impure seed, or from self-sown seed of the variety previously grown on the land. The former may be remedied by sowing small areas for seed purposes with pure seed on clean land. To rid the land of "strangers," I would recommend discing the stubble land shortly after harvest, and thus encourage the early germination of self-grown grains and weed seeds. This practice should commend itself to our farmers, for many other benefits are to be derived—for instance, it conserves in the soil the balance of the moisture in the soil after harvesting the crop, and places the soil in a condition to absorb the autumn rains.

Freedom from Defects and Disease.

Ear-tipping, due to lack of moisture, was responsible for the loss of points by a few crops grown on unfallowed land. The diseases chiefly encountered were flag smut, loose smut, and take-all. Some competitors had followed the advice of last year's judge (Mr. H. Ross, Chief Inspector of Agriculture), and had grown a crop of oats as a remedy for take-all. If this advice is followed, and to make certain, succeeded by a year of clean fallow, the fungus should effectually be starved out. Very little bunt (otherwise known as

stinking smut or ball smut) was detected. In the case of one exhibit, the crop in one paddock was badly affected with bunt, while in the remainder of the crop the disease was not discernible.

I was informed by the competitors that all the seed had been treated with bluestone, using ½ lb. to each bag of wheat. This practice is followed by a number of farmers, but it would be better to consider the amount of bluestone in relation to the quantity of water used, viz., 1½ lb. to 10 gallons, and thus ensure a solution of the correct strength, for it depends upon the strength of the solution whether satisfactory results are obtained.

If the solution is too weak, the spores of the fungus will not be destroyed, and if too strong, the vitality of a large percentage of the seed is impaired. Even with solutions of the correct strength, the vitality of a small portion of the seed is affected, unless immersed after pickling in a 1 per cent. lime solution. One competitor adopted this treatment with a portion of his seed, with the result that a much better stand was obtained than from seed not so treated sown alongside at the same rate and time.

The prevention of flag smut, which was rather prevalent through the crops, is a more difficult matter. In addition to spores on the seed being capable of causing the disease, diseased stubble in the soil may also be a source of infection. While pickling will destroy the flag-smut spores on the seed, if the plant roots subsequently come into contact with diseased stubble, it will contract the disease, and it has not yet been determined how long these spores may retain their virulence in the soil. As a diminishing factor, the stubble of a crop infected with flag smut should on no account be ploughed under, but burnt. It is unfortunate that it should be necessary to destroy this source of organic matter, for the humus of our cultivated lands is year by year becoming gradually depleted.

A more satisfactory means of restoring this essential soil constituent, however, would be found in the growing of fodder crops to be fed off with sheep, and the droppings and plant residues ploughed down. Rust had made its appearance on the flag of the crops south of Wagga. It is not likely that any damage will be wrought, as the cool weather now being experienced is not favourable to the development of the disease.

Evenness.

The crops, taken as a whole, were very even. The principal cause of uneven crops was the germination prior to the rain of a portion of the early sown seed. This unevenness may have been remedied by feeding off close with sheep early in the season. Mr. A. Hamilton's crops, which gained full points for evenness, had been fed off in this manner.

Cleanliness.

The slow growth of the late-sown crops gave weeds an opportunity to make headway, and such crops were, therefore, rather dirty. Wild mustard, wild

poppy, and thistles were much in evidence, but black oats were the chief factor in reducing the number of points obtained for cleanliness. In endeavouring to eradicate this pest of the wheat field, many farmers make the error of cultivating shortly after the oats show green through the soil. It is not generally known that seeds may start to germinate, then be dried, and started to germinate again, without destroying the vitality of the seed. This process may be repeated many times in succession, and may be continued until the store of food in the seed is exhausted. The time which elapses until the young plant ceases to derive nourishment from the seed will depend largely upon the size of seed and the temperature of the soil. In order to make certain of effectively destroying black oats, the young plants should be allowed to make at least a month's growth, then be fed off, and skim-ploughed or disc-cultivated.

Methods of Cultivation

Rather more than one-half of the total area of crops examined was on fallowed land, and it is pleasing to note that four competitors are sufficiently alive to the benefits of fallowing that all their crop was sown on fallowed land. No doubt the great difference in appearance of crops on fallowed land alongside those on unfallowed land this season will serve as an object lesson to many in the district, and induce them to increase their area of fallow in the future. The use of superphosphate is general in the district, but some farmers would benefit by increasing the quantity applied.

Quantities of Superphosphate Applied.

Experiments conducted at Wagga Experiment Farm have shown that best results have been obtained by an application of 56 lb. per acre. One competitor, who applied 40 lb. per acre to his crop, experimented by sowing a few rounds of the drill at the rate of 56 lb., and a much better crop was the result. The maximum points, under the headings for cleanliness and for cultivation methods, allowed to crops on land upon which more than three crops have been grown previously, are 10 points in excess of the maximum fixed for crops grown on new land. It is quite correct that new land should concede points to old land, but in my opinion the handicap that is required of new land is too great The maxima appear all the more unreasonable, when a crop on third-crop land is judged against a crop on fourth-crop land; in this case the former is required to concede six points under each heading to the latter.

Conclusion.

In conclusion, I beg to offer my thanks for the excellent arrangements made to expedite the judging.

DETAILS OF AWARDS.

Name of Competitor.	Area of Crop.	Varieties.	Methods of Cultivation.	When Sown	Quantity of Seed per acre	Quantity of Superphosphate per acre.	Rainfall during growing period.	Number of Crops grown previously.	Apparent Yield.	Trueness to Type.	Freedom from defects and diseases	Evenness.	Cleanliness.	Methods of Cultivation.	Total Points.
	Acs.				lb	lb	pts.		*	†	‡	§	‖	¶	
1. E. Field, Gobbagumbalin.	330	Federation, Zealand, Bunyip, Firbank. Oats.	All fallowed, June to August, harrowed in spring and cultivated with spring-tooth after every heavy rain.	Last week in April to end of May.	45 to 65, Oats 40	45	855	Over 3 crops.	24	29	27	19	27	30	156
2. A. Wooden, Marrar.	200	Federation, Zealand, Firbank.	All fallowed, August and September; harrowed and cultivated	March 15 to last week in April.	60	45	..	4th crop.	27	27	29	19	22	28	152
3. Powell Bros., Forest Hill.	425	Federation, Zealand, Jade, Plover. Oats	Two-thirds fallowed, August and September, harrowed in spring, ploughed second time, autumn; balance not fallowed.	April and May	60	50	928	Very old land.	25	27	27	19	26	26	150
4. A. Alleyn, Downside.	245	Federation, Bunyip, Yandilla King Oats.	All fallowed end of June to August; harrowed once, a portion twice; scarified once, a portion twice.	Mid-April to May 20.	45 to 60, Oats 50.	70 to 80	...	Over 3.	24	27	26	18	26	28	149
5. A. Hamilton, Gobbagumbalin.	210	Federation, Firbank	All fallowed, harrowed, twice cultivated with spring-tooth and disced; fed off with sheep.	April 10 to 20	55 to 65	44	803	3rd crop.	28	27	28	20	23	23	149
6. H. M. Hutton, Bomen.	230	Zealand, Firbank, Yandilla King, Bunyip.	170 acres fallowed and cultivated with spring-tooth after rain. Balance unfallowed.	2nd week April to 2nd week May.	56 to 66	56	.	Old land.	22	29	27	17	27	27	149
7. A. Lewington, Uranquinty.	900	Federation, Firbank. Oats.	500 acres fallowed, July to September; harrowed in spring twice; disced. Balance ploughed, February and May	April 1 to May 26 Oats, Mar. 16 to May 12.	70 Oats, 60.	40	...	Old land.	23	28	28	18	25	26	148
8. H. Crichton, Uranquinty.	760	Federation, Bunyip, Newman. Oats.	4ths fallowed and cultivated Balance, stubble land, ploughed.	March 20 to end of May.	45 to 50 Oats 35.	45	...	Old land.	23	27	27	18	23	26	144
9. J. C. McNickle, Harefield.	548	Federation, Firbank, College Purple. Barley.	Two-thirds fallowed, July to September; harrowed and disced. Balance unfallowed.	2nd week April to end of May	50 to 90	45 to 60	About 600	Over 3.	22	27	27	17	26	25	144

Maximum Number of Points ...	*	†	‡	§	‖	¶
	1 point for every 1 bushel wheat. 1 „ 1¼ „ oats. 1 „ 1¼ „ barley.	30	30	20	1st crop ... 20 2nd „ ... 22 3rd „ ... 24 Over 3 crops 30	1st Crop ... 20 2nd „ ... 22 3rd „ ... 24 Over 3 crops 30

DETAILS OF AWARDS—*continued.*

Name of Competitor.	Area of Crop.	Varieties.	Methods of Cultivation.	When Sown.	Quantity of Seed per acre.	Quantity of Superphosphate per acre.	Rainfall during growing period.	Number of Crops grown previously.	Apparent Yield.	Trueness to Type.	Freedom from defects and diseases.	Evenness.	Cleanliness.	Methods of Cultivation.	Total Points.
	Acs.				lb.	lb.	pts.		*	†	‡	§	‖	¶	
10. Lyons Bros., Forest Hill.	890	Zealand, White Lammas, Dart's Imperial. Oats.	130 acres fallowed, balance ploughed.	April 1 to end of May. Oats, March 12	75 to 90	50	About 900.	1st crop, 2nd crop, and old land.	22	28	28	18	25	22	143
11. W. Mawdesley, The Rock.	240	Federation, Firbank, Bunyip, Zealand. Oats.	About ½ fallowed. August and September, harrowed, disced twice portion of crop fed off Crop harrowed.	April 1 to May 21.	43 to 75	45 to 50	...	3rd crop, and old land	22	28	25	19	24	24	142
11. J. McGilvray, Harefield.	500	Federation, Bunyip, Firbank, Zealand, Dart's Imperial. Oats and Barley	Two-fifths fallowed. July to September, harrowed, disced.	1st week April to last week May.	45 to 76 Oats 45, Barley 40	40 to 50 Barley 30	570	2nd crop and over 3	21	28	28	16	25	24	142
13. A. D. Murphy, Marrar.	340	Federation, Bunyip, Gluyas, Cedar. Oats.	Two-thirds fallowed, harrowed three times, spring-toothed twice.	April 10 to May 24 Oats, last week, March.	42 to 75. Oats 30.	30 to 45, Oats 56.	802	New land, 3rd crop and over 3	20	28	27	19	23	23	140
14. W. J. Dennis, Harefield.	400	Zealand, Firbank ...	Ploughed March; harrowed. cultivated.	April to Mid-June.	45 to 60	56 to 70	...	2nd crop and 3rd crop.	23	28	27	19	23	18	138
15. W. Thompson, Yathella.	240	Federation, Bunyip	200 acres fallowed, cultivated once in autumn.	April 7 to June 12	50 and 60	60	...	Very old land.	21	27	26	18	21	25	138
16. A. Ashcroft, The Rock.	620	Federation, Firbank, Bunyip, Marshall's No. 3, Imperial, Steinwedel.	120 acres fallowed, August, cultivated in autumn.	April 10 to June 20.	50	25 to 40	...	1st crop and 2nd crop.	26	28	28	19	19	17	137

Maximum Number of Points ...

*			†	‡	§	‖		¶	
1 point for every 1 bushel wheat.			30	30	20	1st crop ...	20	1st crop ..	20
1 ,, 1¼ ,, oats.						2nd ,, .	22	2nd ,,	22
1 ,, 1½ ,, barley.						3rd ,, ...	24	3rd ,, .	24
						Over 3 crops	30	Over 3 crops	30

DETAILS OF AWARDS—*continued.*

Name of Competitor.	Area of Crop.	Varieties.	Methods of Cultivation.	When Sown.	Quantity of Seed per acre.	Quantity of Superphosphate per acre.	Rainfall during growing period.	Number of Crops grown previously.	Apparent Yield.	Trueness to Type.	Freedom from defects and diseases.	Evenness.	Cleanliness.	Methods of Cultivation.	Total Points.
17. E. Boyton, Tooyal.	Acs. 250	Federation, Bunyip. Oats.	Two-thirds fallowed; balance stubble land ploughed.	April 1 to May 15.	lb. 56	lb. 50	pts. 828	1st crop, 2nd crop, and old land.	* 23	† 27	‡ 25	§ 17	‖ 22	¶ 22	136
18. J. Phelan, Marrar.	280	Federation, Firbank Bunyip, Marshall's No. 3, Yandilla King Oats.	50 acres unfallowed, balance fallowed and cultivated after rains.	2nd week April to end May.	50 to 75	40	...	New land.	24	27	29	18	19	18	135
19. Jas. Winterbottom Narrandera-road.	250	Federation, Zealand. Yandilla King, Firbank. Oats.	One-third fallowed, August; harrowed in spring, disced in autumn.	End of March to end of June	45 to 60	50 to 60	...	1st, 2nd, and 3rd crop.	22	28	28	18	21	18	135
20. S. Angel, junior, Sandy Creek.	330	Federation, Bunyip, Firbank, Yandilla King, Dart's Imperial.	One-half fallowed, August and September; harrowed, disced, balance unfallowed. Crop harrowed.	April to July	60	20 and 45	1,149	1st and 2nd crop.	25	27	26	19	19	17	133
21. M. J. Hardiman, Uranquinty.	315	Federation, Zealand, Gluyas, Dart's Imperial.	Fallowed, June and July; harrowed, disced twice.	April and May	50 to 60	30 to 50	...	1st crop and old land.	20	26	28	18	19	21	132
22. W. Lee, Uranquinty.	550	Federation, Bunyip...	70 acres fallowed in spring, harrowe twice; disced, autumn; balance cultivated with disc or spring-tooth.	April 1 to June 7.	60 to 90	30	...	1st and 2nd crop.	21	28	28	17	20	14	128
23. C. G. Abbott, Junee.	810	Federation, Bunyip, Zealand, Firbank, Yandilla King. Oats.	About one-third fallowed, August and September, harrowed, cultivated with spring-tooth or disc.	May to July. Oats, April.	50 to 75	35	820	1st, 2nd and 3rd crop.	18	27	25	18	18	18	124

Maximum Number of Points ... * 1 point for every 1 bushel wheat. 1 „ 1¼ „ oats. 1 „ 1¼ „ barley. † 30 ‡ 30 § 20 ‖ 1st crop ... 20 2nd „ ... 22 3rd „ ... 24 Over 3 crops 30 ¶ 1st crop ... 20 2nd „ ... 22 3rd „ ... 24 Over 3 crops 30

Milk and Butter Records.

UNDER THE UNITED PURE BREEDERS' ASSOCIATION SCHEME.

M. A. O'CALLAGHAN.

A LITTLE over a year ago the scheme devised by the Pure Breeders' Association, assisted by the officers of the Dairy Branch of the Department of Agriculture, was inaugurated; and complete records are now available for a number of cows for a lactation period of nine months (273 days).

The first herd submitted for testing was that managed by the President of the Association, Mr. J. T. Cole, and the records of a number of the Shorthorn cows, the property of the Scottish Australian Investment Company, Darbalara, Gundagai, are now made public. These records will form a pleasant study for all who are interested in the welfare of Australian dairying, and more particularly for those interested in the Australian type of milking Shorthorn.

RECORDS of an Australian Shorthorn Herd, all of which are registered in the Milking Shorthorn Herd Book.

Name of Cow.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of Test. Milk.	Yield on last day of Test. Butter.
	Years.	1912.	lb.	lb.	lb.	lb.
Daisy 6th	2¼	31 August	6,600	343	16·75	1·00
Madame 6th	4	18 ,,	7,825	394	15·25	·85
*Lily 3rd...	7	3 Sept.	14,742	580	37·50	1·50
Camellia 2nd	10	1 ,,	10,366	446	17·75	·77
Champion 3rd	8	28 July	10,299	563	19·25	1·09
Melba 3rd	7	12 October	13,818	585	21·50	1·03
Viola 4th	8	28 August	7,162	323	9·50	·46
Lily 2nd	8	17 Sept.	8,798	387	16·50	·70
Daisy 2nd	10	18 ,,	7,074	333	15·75	·89
Sybil	10	20 ,,	9,639	452	28·00	1·42
Eva 2nd	7	22 ,,	6,848	336	3·00	·18
Dolly 4th	8	25 ,,	9,891	395	27·75	1·10
Melba 6th . .	3	30 ,,	8,000	323	24·25	·95
Posey	12	30 ,,	8,570	447	20·00	1·10
Lucy 2nd	10	28 ,,	6,511	276	6·00	·27
Dolly 6th	7	30 ,,	6,777	296	12·00	·52
Gem 2nd	7	26 ,,	6,764	331	9·00	·45
Slipper	8	12 October	9,732	452	29·00	1·41
Poppy	4	16 ,,	6,261	293	16·25	·79
Moonlight	8	22 ,,	7,281	337	16·00	·72
Canary	8	5 ,,	6,750	305	10·25	·56
Sweet Nell II.	4	23 ,,	6,536	323	16·00	·88
Matilda 2nd	10	21 ,,	7,021	285	11·00	·44
Alice	11	14 ,,	7,361	338	15·00	·68
Daisy	15	25 ,,	7,166	356	23·00	1·17
Gem	12	20 ,,	6,692	310	21·00	·96
Bertha	10	10 Nov.	8,699	430	22·50	1·40

* The cow Lily 3rd did not get in calf until she had been calved some months. This is the reason why she was milking so heavily at the end of the nine months' period.

It might be added that the Department of Agriculture of New South Wales recently secured a yearling Shorthorn bull by "Emblem of Darbalara" from "Melba III"; and, as this youngster is by the Champion Dairy Shorthorn Bull of New South Wales, from a record milk and butter producer, he should prove a very desirable acquisition to the Government stud herd. At the same time three heifers of the very best milking families in the Darbalara herd were secured.

This shows the value of the official system of testing now carried on. Had we not had an authentic record for "Melba III" I could not have recommended the Government to purchase her young bull at a cost of 75 guineas.

All tests have been carried out by officers of the Dairy Branch, and all cows were milked out clean before each test began. Other herds will be dealt with in future issues.

Dairy Shorthorn Cow, Melba III, which yielded 585 lb., the highest quantity of butter in nine months in the above test.

The property of Darbalara Estate.

The Value of Barley (grain) for Horses.

Barley is considered a good feed for horses, but in order that they may get the full benefit of it, it is desirable that it should be crushed or bruised, otherwise, owing to its hardness, a good deal will pass through undigested.

In changing the feed from maize to barley, it would be well to do it gradually, replacing a quarter of the maize by barley at first, and slowly increasing the amount of barley. To give the equivalent of 6 quarts of maize, 8 quarts of barley should be given.—*Veterinary Officers of the Stock Branch.*

Some of the more Common Internal Parasites of the Horse.

Compiled by the Veterinary Officers of the Stock Branch under the authority of S. T. D. SYMONS, M.R.C.V.S., Chief Veterinary Officer.

ALL animals are subject to the invasion of parasites. These either live entirely on the skin or in one of the important tracts or organs of the body. Thus, some attack the respiratory tract, others confine their attention to definite organs, whilst those it is now intended to deal with attack the digestive or alimentary tract.

The medium for the development of a large number of parasites is the digestive tract, into which they pass mainly by means of drinking water in a more or less advanced stage of development.

Many, of course, perish owing to their failure to find the special conditions necessary for the completion of their life history or because they are not sufficiently developed for their new surroundings, whilst some may have passed the stage necessary for becoming mature forms of their own special species under new conditions, and are destroyed by the action of the various digestive juices.

Each parasite, in whatever form it enters the body, takes up its new quarters in that portion which is most suitable to it.

Diagnosis.

In all cases when animals show symptoms of digestive derangements, with a tendency to constipation, intermittent diarrhœa of a chronic nature, become greedy feeders, acquire large bellies, or have a dry coat and unthrifty appearance, an examination of the mouth should be at once made to see if the teeth are in good order.

The teeth being found in satisfactory condition, they as the cause can be eliminated. The next procedure is to make a careful examination of the fæces, as occasion offers, to see if it contains adult worms, and it may be necessary to forward some for the purpose of microscopical examination to see if it contains either the ova or eggs of any parasite or any immature forms.

In many cases, on the other hand, no symptoms indicating their presence are noticed during life, and it is not until an autopsy has been made that their presence is revealed.

Parasites of the Stomach.

1. *Gastrophilus equi*, or Horse Bot, has been already described in Leaflet No. 2, issued by the Stock Branch.
2. *Spiroptera megastoma.*—These are very minute white worms which burrow under the mucous or lining membrane of the organ, and form small round tumours varying in size from that of a nut to a fowl's egg, and are mostly located in that portion of the organ into which the gullet opens, but may occur in the other half of the stomach which opens into the small bowel.

In the event of many forming in the last-mentioned area they would in all probability hinder the passage of the food into the small bowel, and in this way set up serious digestive trouble. Such cases are the exception, however, and usually no detriment is experienced from their presence, and not until an autopsy is held is their presence revealed.

Parasites of the Small Intestine.

Ascaris megalocephala.—This is the largest worm found in the horse, and may be found to reach a size of from 12 to 18 inches. Its body is yellowish-white and rigid, and it is often the cause of digestive trouble.

They have been known to cause occlusion, or stoppage in the bowel, resulting in fatal colic, and in some cases, after death, rupture of the bowel has been revealed.

A chronic catarrh of the bowel and a slight but obdurate diarrhœa is often present, the expulsion of the fæces being immediately followed by a watery discharge from the intestine. On an autopsy being made they are found massed in bundles in the first portion of the small bowel, and if very numerous may pass into the stomach.

Treatment may consist of:—

1. The administration of a course of powders, followed by a good dose of laxative medicine.
2. A drench alone given first thing in the morning, the animal having been given a mash overnight and all other food being withheld.

If the first treatment is adopted the following powder should be given once daily for six days, well mixed in a little feed, prior to the main morning feed being given:—

Powdered arsenic	5 grains.
Flowers of sulphur	3 drachms.
Powdered sulphate of iron	2 ,,
Aniseed	½ ounce.

The above constituting one powder.

On the morning of the seventh day, the animal having been given a mash overnight and all other food being withheld, a good dose of laxative medicine of from 1 to 1½ pints of linseed oil is administered, no other food being given for four hours afterwards.

If a drench alone is given.—After giving a bran mash overnight, all other food being withheld, the following morning a drench, composed of—

Oil of turpentine...	1 oz.
Lysol	2 drachms
Linseed oil	1 to $1\frac{1}{2}$ pints

should be administered, food being withheld, as previously mentioned.

The drench should be continually shaken up during its administration and be given slowly.

Parasites in the Large Intestine.

Sclerostoma armatus and *tetracanthus* are the parasites of this region; in both species the female is larger than the male, in the case of the former measuring $1\frac{1}{2}$ to 2 inches, the latter being one-third smaller. Their bodies are faintly striped, and their colour depends on the situation they are found in—brown if in the bowel, while, if in the tissues, they are blood red. They are the most dangerous of all the parasites affecting the horse; although they develop mainly in this area, forming small tumours in size from a pin's head to a small almond nut, they often migrate and pass into the blood stream, forming an aneurism or dilatation of part of or the whole of the circumference of the artery they enter, causing it to burst, with the result that the animal dies from internal hæmorrhage.

Clotting of the blood may also occur through the roughening of the lining membrane of the vessel frequently initiating a fatal colic.

Animals affected with them become anæmic, pot-bellied, and unthrifty; diarrhœa is constant, and in the last stages general dropsy supervenes before death, in the event of none of the most acute results previously mentioned occurring.

Treatment.—The following will be found, as a rule, effective:—

Thymol, 15 grains to 2 drachms, according to age,

dissolved in from 2 to 4 oz. of glycerine and given once daily on six consecutive days, well mixed in a small feed prior to the main morning feed.

On the seventh morning, after being mashed, a good dose of laxative medicine is administered. In the case of young animals equal parts of castor and olive oil are advisable, whilst in mature animals linseed oil should be given.

Oxyuris curvula.—A small worm, about 2 inches long, found throughout the length of the large bowel, also in the rectum, and sometimes seen protruding from the anus, to the margin of which it is attached. It causes a good deal of irritation, the animal often rubbing the hair out of the tail, sometimes abrading the skin; otherwise it does not seem to be detrimental to its host.

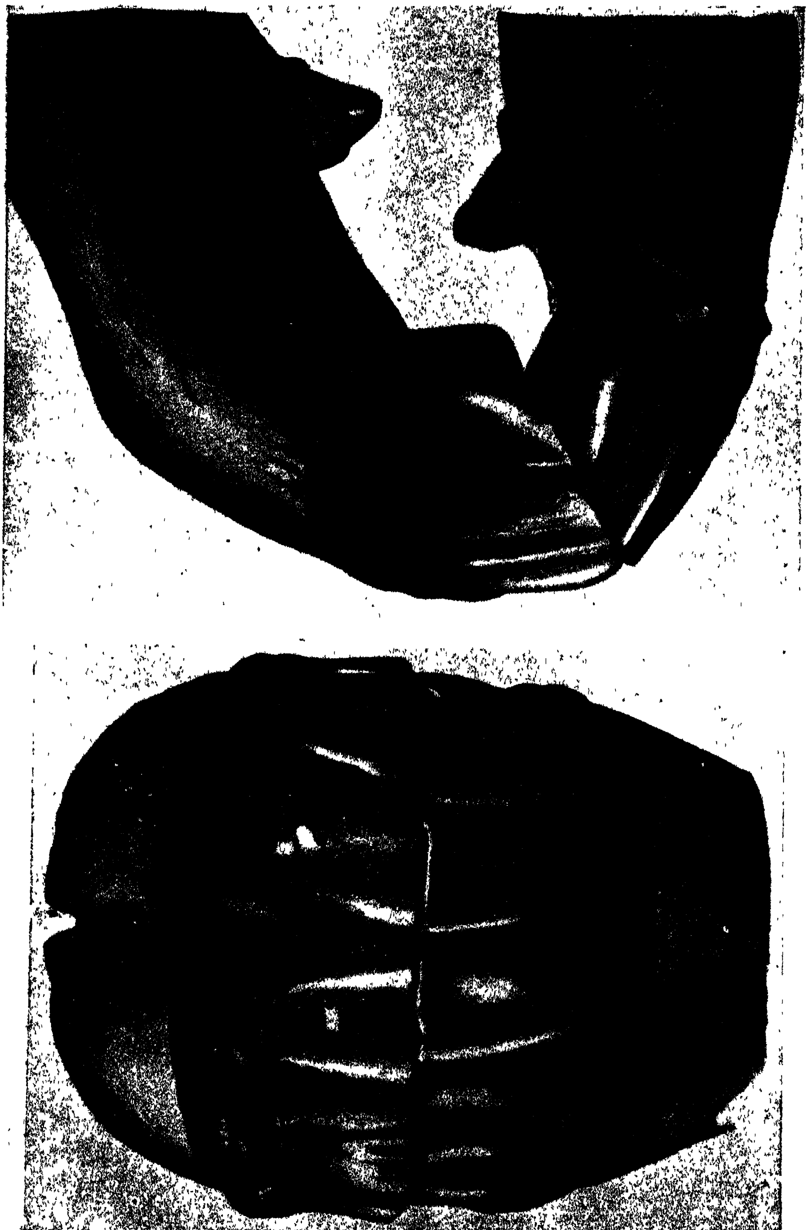
Treatment.—Copious enemata of salt and water, or of an infusion of quassia, are usually found effective in getting rid of them.

It is often necessary to prolong the treatment laid down for these various parasites, and for this reason the animal should be watched carefully for any symptoms pointing to a recurrence of the trouble.

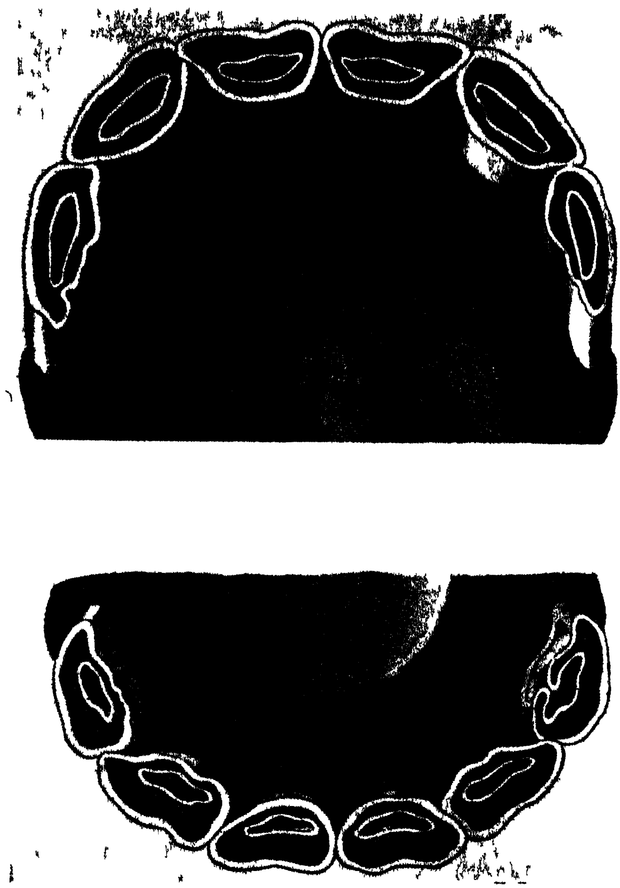
The Teeth of the Horse and its Age.

[Continued from Vol. XXIV, page 1036.]

Compiled by the Veterinary Officers of the Stock Branch under the authority of S. T. D. SYMONS, M.R.C.V.S., Chief Veterinary Officer.



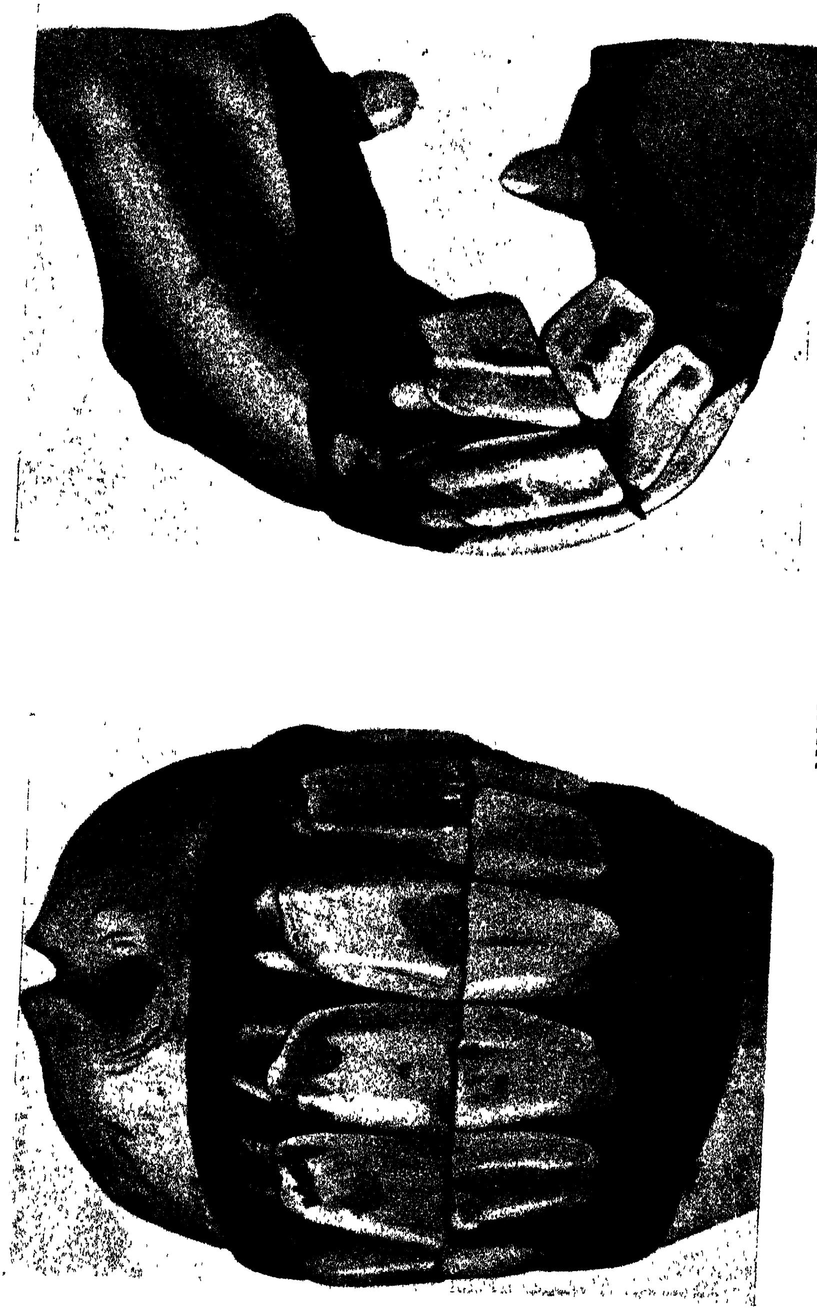
EIGHT YEARS.



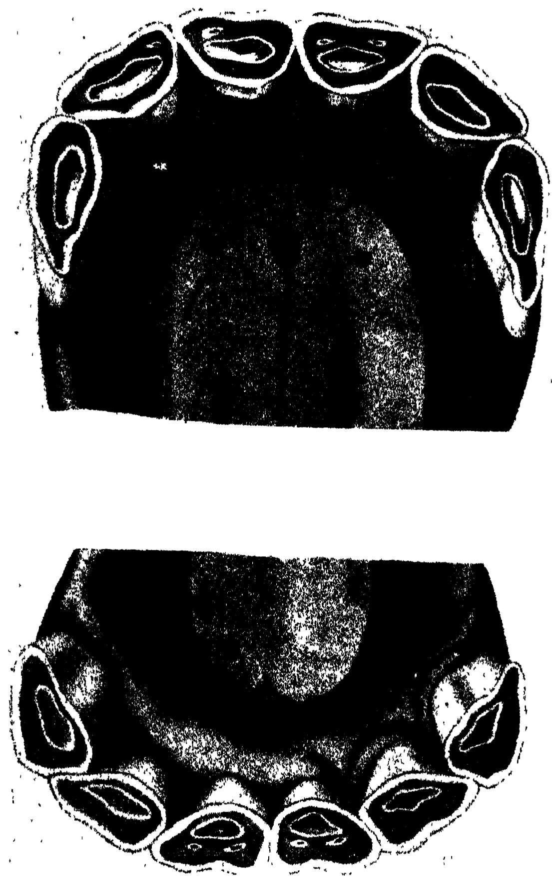
MOUTH AT EIGHT YEARS.

[*After Goubaux and Barrier.*]

At 8 years the direction of the incisors is notably changed in both upper and lower jaws, and they are opposed obliquely. The lower corner incisors have lost their dental cavities.



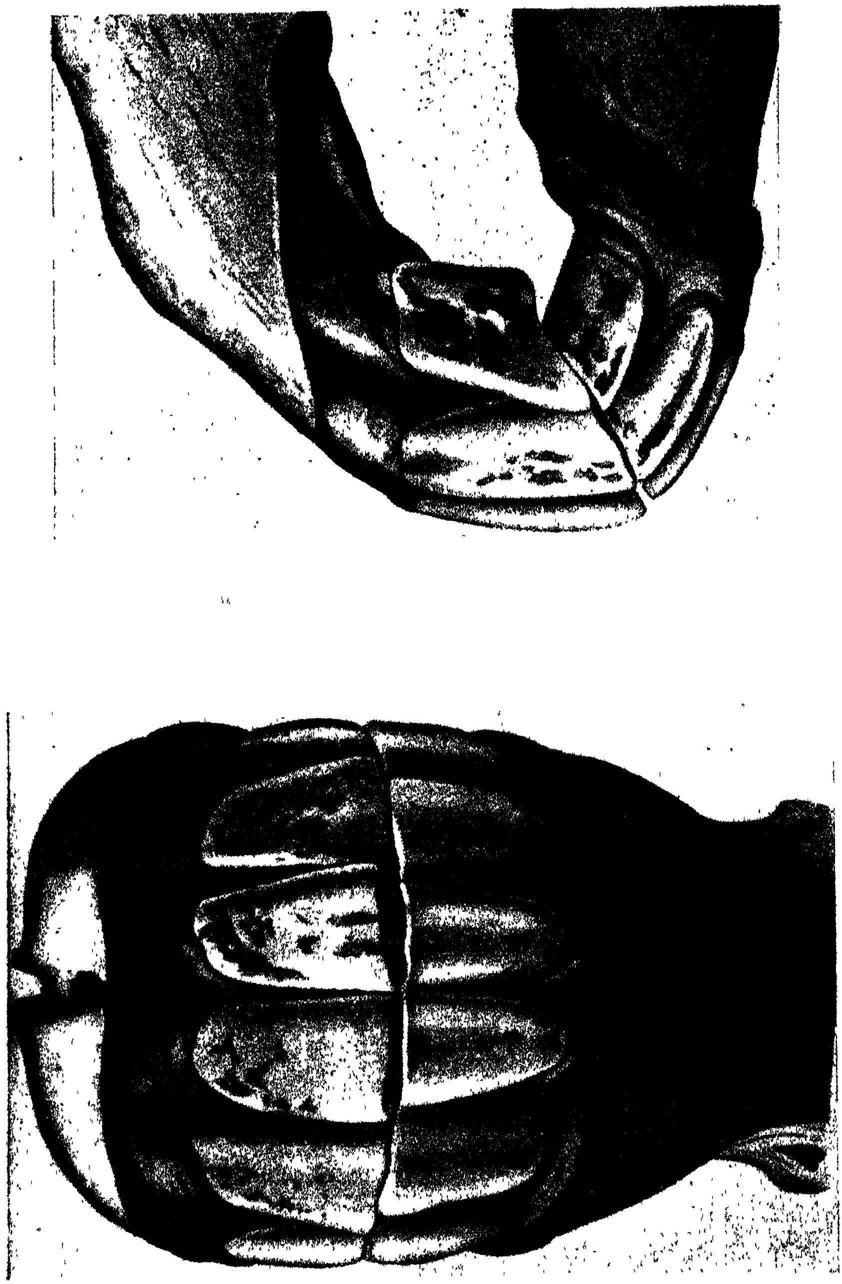
NINE YEARS.



MOUTH AT NINE YEARS.

[*After Goubaux and Barrier.*]

At 9 years nothing special is to be seen upon the jaws viewed in front or in profile. The teeth are ordinarily more oblique and less fresh looking than at the previous age; a slight groove has begun to show at the neck of the upper corner incisor. The dental cavities have disappeared out of the upper central incisors, and all the incisors have decreased in width, and in most jaws are levelled. Upon the tables the central incisors are round, the laterals becoming round and the corner teeth are oval.



TEN YEARS.

MOUTH AT TEN YEARS.

[After Goubaux and Barrier.]

In consequence of the more marked obliquity of the teeth, the jaws at 10 years become prominent in front when they are examined from this point, and it is necessary to raise the head of the horse higher in order to have a good view of the lower incisors. Upon the tables the lateral incisors are round, and the corners are tending to assume this form.

(To be continued.)

The Use of Burgundy Mixture for Irish Blight.

UP to the present, the most successful method of attacking Irish Blight in New South Wales has been the use of Bordeaux mixture, the well-known spray compounded of sulphate of copper and lime. Experience in some parts of Ireland has shown the superiority of Burgundy mixture, in which washing soda replaces the lime, and the following extracts are taken from a leaflet published by the Department of Agriculture and Technical Instruction for Ireland.

Tests spread over five years in that Department's Agricultural Stations showed that while the use of Bordeaux mixture gave an average increase of 34 cwt. per acre over the unsprayed plot, the use of Burgundy resulted in an increase of 50 cwt., and in each of the five years the Burgundy was the more effective, while in other cases the balance has been slightly in favour of Bordeaux.

Method of Preparation.

Burgundy mixture is made in the following proportions:—

2 lb. sulphate of copper of 98 per cent. purity.
2½ lb. washing soda of 98 per cent. purity.
10 gallons clean water.

In many cases farmers use a barrel of 40 gallons capacity for preparing the mixture. For this amount four times the above quantities will be required, namely:—

8 lb. sulphate of copper.
10 lb. washing soda.
40 gallons water.

The preparation of the mixture should be set about in the following manner:—

Thoroughly wash out the barrel and pour into it 35 gallons of clean water. The 8 lb. of sulphate of copper should then be put into a canvas bag or tied up in a piece of canvas cloth, and put into and moved about in the water in the barrel until the crystals are dissolved. This operation can be more quickly accomplished if the crystals of sulphate of copper have been previously ground.

Having prepared the solution of sulphate of copper, next dissolve the 10 lb. of washing soda in 5 gallons of water in a separate vessel. Then pour the washing soda solution slowly into the copper sulphate solution in the barrel, stirring continuously. The mixture should then be ready for use.

NOTE.—*Even when the above conditions are accurately carried out the mixture may not give the best results, owing to differences in the strength of the sulphate of copper and of the washing soda. Those who wish to get the best results should dip a piece of blue litmus paper in the prepared mixture. If the paper becomes red, more washing soda should be dissolved and added in small quantities at a time to the preparation, and with continuous stirring, until a fresh piece of paper dipped in the mixture remains blue. One pennyworth of litmus paper, which may be obtained from any chemist, is sufficient for a large number of tests.*

The method of making Bordeaux mixture has often been referred to in these columns.

General Observations.

The following points should be borne in mind:—

1. Sulphate of copper dissolves very slowly in cold water. If at all convenient, it will be found better to dissolve the material in hot water and then add the required quantity of cold water. The same remarks apply to washing soda.
2. There is no harm in dissolving sulphate of copper and washing soda or lime in separate vessels, and holding the solutions over for several days, but once the solutions are mixed together the mixture should be applied immediately. If held over even for a day it deteriorates rapidly and is then much more readily washed off the plants by rain.
3. All the vessels coming in contact with the sulphate of copper should be of wood and not of metal.
4. It will save much time and annoyance if every possible precaution is taken to have the mixture free from grit or any other foreign matter which would stop the nozzles of the sprayers. For this reason the water used should be strained through a piece of canvas or other suitable cloth.
5. The milk of lime or washing soda solution should always be poured into the sulphate of copper, and not conversely.
6. Effective stirring in every stage of the operation is essential to success.
7. Sulphate of copper is poisonous, therefore the vessels in which sulphate of copper mixtures have been prepared should not afterwards be used to hold food or water for consumption.
8. The addition of soot, treacle, or other materials to spraying mixtures is not recommended.

Advantages of using the Sulphate of Copper and Washing Soda Mixture.

The Department of Agriculture and Technical Instruction for Ireland recommends the use of washing soda in preference to lime for the following reasons:—

1. The spraying mixture adheres longer to the foliage of the plants, and is not so readily washed off by rain.
2. The mixture can be more easily prepared.

3. The nozzles of the machine are not so liable to become stopped with grit or refuse material. If washing soda is used and the mixture is carefully made, there should be no sediment.

Application of the Mixture.

Spraying should be done before signs of disease are observed in the crop. It is therefore desirable that the first dressing should be applied before the disease appears. The actual date of the first spraying will depend upon the season, *i.e.*, the prospects of an early appearance of blight, and upon the development of the crop. A second spraying should be given about two or three weeks after the first application, as in that interval a large quantity of foliage will have developed, and a considerable portion of the original dressing may possibly have been washed off by rain. A third dressing may sometimes be advisable, especially in a wet season.

The best results can only be obtained when a sufficiently high pressure is maintained in the sprayer for the mixture to be forced out as a very fine spray; by this means the foliage can be completely covered, and there is little waste through the mixture falling on the ground.

Spraying should be done during dry weather. If rain should fall heavily soon after spraying, examine the foliage, and if the mixture has been washed off to a considerable extent, spray again. Spraying should be suspended when it is raining.

Quantity per Acre.

The quantity of the mixture to be applied per acre for one spraying is approximately as follows:—

For an average crop of potatoes with fully-developed foliage, about 100 gallons per statute acre. For a crop of potatoes with a small amount of foliage, a somewhat less quantity will suffice.

The quantity of raw materials required to spray an acre properly are, therefore, 20 lb. sulphate of copper and 25 lb. washing soda.

Care of Spray Pump.

The external bearings of the spraying machine should be frequently oiled, but care should be taken not to let any of the oil get upon the rubber parts of the machine. The machine should be well washed out with water immediately after use, thoroughly cleaned and dried, and the pump oiled before being put away.

SPRAYING.

THE point has been raised whether, when apple trees growing in a pasture paddock are sprayed in accordance with the Departmental regulations with arsenate of lead, the grass round the trees would be poisonous to cows.

In reply, Mr. F. B. Guthrie states that he has never heard of any ill effects from this cause. At the same time, if the spraying has been a heavy one, it might be well to put the cows into another paddock for a week or so.

Tree Planting in Southern California.

W. MERVYN CARNE.

SOUTHERN California is a very large place, with perhaps as widely diverse conditions as may be found everywhere. But to Americans in general, Southern California means those once barren valleys now known for their wealth and beauty throughout the world. To the Australian, scenting home amidst the ever present gums, come thoughts of the future. Surely we in Australia, with natural advantages so similar to California, can do as much for our land as the Americans have done for theirs? Redlands, Riverside, and many another city have solved the old argument of city *v.* country, by being so much of both that one cannot say where one ends and the other begins. Small areas, intense cultivation, and civic pride have made this beautiful country. It is "up to" Australia to do likewise. Much of the charm of the cities (all are not beautiful) lies in their trees. Almost to a tree they have been planted by hand, for except on the mountain ridges, Southern California is practically treeless. Many kinds of trees are found in parks and gardens, but the following predominate, and will probably prove the most useful in South-eastern Australia. One of the most common is the Pepper tree (*Schinus molle*), whose hardiness and rapidity of growth is proverbial, and needs no emphasising. Eucalypts of many species are used, but the Blue-gum (*E. globulus*) predominates. It is planted in avenues, as breakwinds, and in groves for timber and firewood. In avenues eucalypts are usually topped about 6 feet from the ground, and send up three to six stems above that point. For firewood they are cut down, and suckers allowed to shoot from the butt, three or four to each tree. The trees are cut over in rotation every four to seven years.

Silky oak (*Grevillea robusta*) is largely used in streets. The Kurrajong, often miscalled Bottle tree, and the Camphor Laurel, give a pretty effect with their lighter greens, and are often alternated. The former does not appear to produce seed in quantity, though Australian trees are usually very prolific in America. Pines are not largely used, though not uncommon, and include the Bunya Bunya and the Moreton Bay pines, as well as *Pinus radicata*, the common pine about Sydney suburban streets. The most popular street tree is one not seen in Sydney, yet well worthy of trial, though it grows wild from Tasmania to Queensland. That is the Blackwood (*Acacia melanoxylon*), one of the largest of our wattles, and a valuable timber tree. It is used in great numbers, forming shapely, clean, dark-green trees up to about 50 feet. It seems very free from the troubles, insect and fungous, which frequently bring about the premature death of acacias in Australia. Last, and perhaps most striking of all, are the Palms. The majority belong either to genus Phœnix or to Washingtonia. The Phœnix palms are

relatives of the date palm, itself sometimes used. Being relatively slow-growing it is not so widely used as the Washingtonias. Until a few years ago the latter palms were known as *Washingtonia robusta.* It has been found that there are at least three distinct species, the best and hardiest being *W. filifera.* Another species, *W. gracilis*, is sold by seedsmen as *W. robusta.* Another smaller palm, *Washingtonia sonoræ*, is also used, and a glaucous coloured species called *Erythea armata.* Magnolias are not uncommon.

In Arizona few evergreen trees will survive the combined effects of frost and great heat even under irrigation, and the favourite tree is the Umbrella Tree (*Melia azedarach*), better known to us as the White Cedar or Bead Tree. It is usually topped to encourage the umbrella habit. The famous Magnolia Avenue at Riverside consists of three rows of trees—Peppers, Blue-gums, and an alternating row of Silky Oaks and Washingtonias. These, with the Blackwood in the streets, form the bulk of the tree-plantings in Southern California, and serve as a striking object lesson of what can be accomplished among apparently unfavourable surroundings.

Incubating Duck Eggs.

Incubators do not give satisfactory results with Muscovy duck eggs. Fair results can be obtained by setting the eggs half the time under ducks and finishing them with the incubator. The best results are only obtainable with the ducks themselves, as five weeks is too long for the incubator.

Pekin, Aylesbury, and Orpington ducks hatch all right, and moisture machines usually give good results. The only special treatment required is to run the incubator 1 or 1½ degrees lower for duck eggs than for hen eggs, and keep the moisture well up to them when hatching.—J. Hadlington.

Healing Ointment for Cattle.

A correspondent asks for a recipe for a home-made ointment for healing wounds in cattle.

In reply, the Chief Inspector of Stock states that to make up an ointment it would be necessary to use either lard or vaseline as a basis, and to 4 ounces of either of these add 1 ounce of turpentine and 1 ounce of eucalyptus oil. This well mixed together makes a useful ointment for wounds. All wounds should always be well washed with soap and water, or water with a little lysol added. To measure the ingredients, a tablespoon can be used, as when full of liquid it holds about an ounce. About six times the same bulk would represent 4 ounces of lard.

The Bird as the Farmers' Friend.

[THE following is an extract from a paper read by James Buckland at a meeting of the Royal Colonial Institute in June, 1913, in support of the Plumage Bill which sought to prohibit the sale in Great Britain of the skins and feathers of the wild birds of His Majesty's Dominions beyond the Seas. It summarises the case for the birds in very complete fashion. We are indebted to *United Empire* for the article.—ED.]

HE who studies living birds, other animals, and plants, and the relation which these living organisms bear to one another, will soon learn that the main effort of each animal or plant is to preserve its own life and produce young or seed, and so multiply its kind. He will see, also, that the similar efforts of other organisms by which it is surrounded tend to hold its increase in check. This action and reaction of natural forces constitute what is known as the balance of nature.

Vegetation is the prime requisite for the perpetuity of all other forms of life upon the earth. The greatest known enemy to vegetation is insect life, whose multitudes prey not only upon the necessities of mankind, but upon man himself, and upon all other forms of life. Although entomologists have accumulated careful descriptions of over 300,000 species of insects, they estimate that there remain about 700,000 to be described. Professor Riley, in his elaborate studies of the hop-vine aphis, observed that the species developed thirteen generations in one year, and that the average number of young produced by each female was 100. Assuming that every female at maturity produced its full complement of young, he computed that this insect, if unchecked to the end of the twelfth generation, would have multiplied to the inconceivable number of ten sextillions of individuals. As figures fail to convey to the mind any adequate conception of the fecundity of this insect, I will resort to space and the velocity of light to bring it more intelligibly before you. If the unchecked progeny to the end of the twelfth generation were marshalled in a line, ten to the inch, the line would extend beyond the farthest fixed star that the strongest telescope might search out to a point so sunk in the profundity of space that light travelling from the head of the procession at a rate of 184,000 miles per second would require 2,500 years in which to reach the earth. One does not need to be told that the remotest approach to such unchecked multiplication would paralyse the hop-growing industry in one season. While the aphides may represent the extreme fecundity, there are thousands of insect species, the unchecked increase of any one of which would soon overrun a continent. Mr. A. H. Kirkland has computed that the unrestricted increase of the gipsy moth would be so great that the progeny of one pair would produce enough caterpillars in eight years to devour all the foliage in the United States. A Canadian entomologist states that a single pair of Colorado beetles, or potato bugs, as we call them, would, without check, increase in one season to

60,000,000. At this rate of multiplication the disappearance of the potato plant would not be long delayed. The chinch bug, a fecund and destructive pest, has been found in a clump of grass 8 inches in diameter to the number of 20,000. The progeny of this colony alone, if unchecked, would soon become incomputable hordes, devastating wide areas of the earth's surface. Those of you who have been in South Africa probably have seen locusts in flight which filled the air and hid the sun. What a potency for evil lies hidden in the tiny but innumerable eggs of these ravening pests! If every egg was permitted to hatch, and every young locust to come to maturity, the consequences would be too dreadful to contemplate.

The voracity of insects is almost as astounding as their powers of reproduction. I have time to cite one example only. The daily ration in leaves of a caterpillar is equal to twice its own weight. If a horse were to feed at the same rate, he would have to eat a ton of hay every twenty-four hours. Who, or what is it that prevents these ravening hordes from overrunning the earth and consuming the food supply of all? It is not man. Man, by the use of mechanically applied poisons, which are expensive, unnatural, and dangerous, is able to repel to an extent the attacks on his orchard and garden; out in the fields and in the forests, he becomes, before any great irruption of insects, a panic-stricken fugitive. Neither is it disease, or the weather, or animals, or fungi, or parasitic and predaceous insects within their own ranks. However large may be the share of these particular natural agencies in keeping insects in check, experience has shown that it is lamentably insufficient. Then what is it? The bird. Bird life, by reason of its predominating insect diet, is the most indispensable balancing force in Nature. At no period in its life is a tree exempt from insect depredations, and every part of it, from the genital seed, or nut, to the terminal bud, blossom, or fruit, is attacked.

It should be remembered that the period of growth of leaf and blossom is also the nesting season of birds, and that even seed-eating birds now feed their young on insects. As the digestive organs of birds are so constructed and equipped that they can both contain and dispose of a very large quantity of food, and as most birds eat most of the time, the number of harmful insects consumed by parents and nestlings at the very time when such destruction is most needed is almost incredible. This shows the existence of a natural economic relation between these three orders of life. There is a sort of interdependence, and the existence of each one is dependent upon the existence of the others. But for the trees, the insects would perish; and but for the insects, the birds would perish; and but for the birds, the trees would perish.

We can afford to spray an orchard-tree which yields an annual dividend of fruit, but, mechanical difficulties aside, we cannot afford to spray a forest-tree which yields its crop once only in a lifetime. For the preservation of his forests, man is wholly dependent on the services of the bird. In the woods of Canada, in the forests of Africa, in the jungles of India, in the bush of Australia, this faithful ally of ours, as a matter of course, and with-

out any trouble or expense to us, is daily accomplishing on our behalf the superhuman task of saving the lives of the trees. Yet we are permitting the feather trade, like a giant devil-fish, to reach out its tentacles into the innermost recesses of the forests of our Empire, and steadily to draw in the skins and feathers of every one of these feathered guardians of the tree.

The natural inter-relation and interdependence that is established between the tree, the insect, and the bird is established also between the insect, the bird, and every other form of vegetation on the earth. In domiciling our increasing millions in lands beyond the seas we have given no thought to the natural increase of insect pests which invariably attends the operations of the agriculturist. Finding in cultivated crops new and more succulent sources of food supply, insects change their primitive habits to swarm and multiply exceedingly upon the fertile fields and green pastures of man's creation. In addition to this, as the pioneer introduces plants and seeds from the land he has left, he unwittingly introduces with them insects, too, to swell the hordes of native depredators. When we reflect on the number of insect pests to which man's farming operations must always give rise, we must admit that he can ill afford to lose the services of the bird in the war which he must wage continually against organic Nature in order to maintain his artificial standards against her inexorable laws.

In 1909, replying to the London Chamber of Commerce (which sought on behalf of its Plumage Section to obtain a repeal of the law which prohibits the export of plumage from British India), the Bombay Chamber of Commerce pointed out that the prohibition was meant not only to prevent beautiful birds being exterminated, but also to prevent useful birds being reduced in numbers. It was explained that it was a recognised fact that crops of all kinds were subjected to incalculable damage by insect pests, and that the combating of this evil had become one of the greatest difficulties of the Indian agriculturist. The principal enemies of these pests, it was further noted, were the insectivorous birds, yet these were the very species that hitherto had been relentlessly slaughtered for their plumage. In 1911 the Melbourne Chamber of Commerce, in replying to a letter from the London Chamber of Commerce, pointed out that the work performed by the wild birds in the Commonwealth alone, in keeping in check the ravages of myriads of noxious insects, was worth many millions of pounds sterling. The natural enemies of insect pests, the Melbourne Chamber went on to say, were the birds, and were they destroyed, Nature's equilibrium would be upset, and sucessful agriculture would become impossible. Birds, it was added, were vastly more valuable to the community when alive than when dead, and converted into millinery ornaments. In last year's Report on Egypt, Lord Kitchener stated that the indiscriminate destruction of bird life had allowed an enormous increase of insect pests, for the combating of which steps were to be taken. Lord Kitchener knew that in spite of the improved methods of fighting insects there was only one step that he could take that would be effective. A Khedival Decree was issued forbidding the catching, killing, or taking the eggs of Egypt's insectivorous birds. In issuing this

Decree, two things were prominent in Lord Kitchener's thoughts—the destruction of the egret for its plumes, and the fact that in the Valley of the Nile this bird is one of Nature's checks on the cotton worm. If it were not for the services of the bird, there are many parts of our Empire in which man could not keep his live-stock, from which he himself would be driven in headlong flight. No part of our insect-ridden Empire—not even India—has been so exploited for plumage as our Crown colonies in the West Indies. The destruction of bird life in Jamaica has led to such an increase of the grass-tick that the keeping of most breeds of cattle has become impossible.

Because of the number of venomous insects in the neighbourhood of the Panama Canal, one of the first acts of Mr. Wilson, when he became President, was to issue an Executive Order prohibiting, under heavy penalties for infraction, the destruction of any wild bird in the Canal zone.

For every fly-catching and parasite-eating bird that is killed, Nature's fight for the care of her children is weakened by the loss of a very active agent. Yet the number of egrets and white herons, glossy starlings, cuckoos, orioles, shrikes, kingfishers, rollers, bee-eaters, barbets, trogons, and other fly-catching and parasite-eating birds that are killed annually for their plumage in our possessions in Africa must be materially reducing their working power. To gauge the extent of the destruction, take one case only, that of the kingfisher. I should mention that in warm countries these birds belie their name, and feed for the most part on insects. At the last six feather sales in London there have been sold the skins of 272,000 kingfishers. Supposing that each of these ate 150 noxious insects daily—a very conservative estimate—we have then many billions of insect pests saved in a single year that ought to have been destroyed by the agency of birds that have been themselves destroyed, and their services for ever lost to mankind, for no worthier purpose than millinery. And this estimate, do not forget, does not take into account the unrestricted increase of these pests. Every one of these kingfishers was worth its weight in gold to the human race. Its skin sold for 3½d. Take another case—that of the Indian roller. Immense value is attached to the food habits of this bird. Besides eating locusts and grasshoppers, which are extremely harmful to crops all over India, it feeds greedily on the dreaded white ant. Yet thousands of these birds are sold annually at the London feather sales. And the price! Last October, just to give you an idea, one auctioneer sold 1,060 skins of this bird for 1d. each, and 2,575 for ½d. each.

The number of pestiferous rodents eaten by hawks and owls is almost as surprising as the number of caterpillars eaten by insectivorous birds. In 1885, before the United States had learned her lesson in the economic value of birds, the Legislature of Pennsylvania passed an Act which provided a bounty on every hawk and owl shot. The bounty was claimed on 180,000 hawks and owls. An irruption of rodents followed, which did 3,850,000 dollars' worth of damage to the agricultural interests of the State. The Legislature repealed the Act.

Were it not for the locust-birds, there are many localities in United South Africa in which agriculture would perish. If it were not for the ibises, spoonbills, and cranes in Australia, which check the periodical irruption of grasshoppers, there are many districts in the Commonwealth in which farming operations would be impossible.

The great services which birds render the Empire as weed-destroyers (10,000 seeds of harmful weeds have been found in the stomach of a single bird), as scavengers of bays and harbours (a great human mortality has been known to take place owing to the destruction for their plumage of sea-birds, which kept the beaches free from decaying animal matter), as tree-planters, not to mention a dozen other benefits, cannot be dilated upon now. It is of more importance that you should know what the destruction of bird life means to the Empire in increased cost of living. I am obliged to go to the United States for data for my arguments.

It was not until many of the most valuable species of birds had been slaughtered to the point of extermination that the people of the United States realised their immense value. They showed their wisdom by profiting by the lesson of events. The slaughter has been practically stopped. Years, however, must elapse before the balance of Nature can be restored. As a warning to us, I propose giving some facts and figures to show what the destruction of bird life in the past is costing the United States to-day.

Scientific examination, conducted throughout the four seasons, has been made by the experts at Washington of an immense number of the stomachs of all classes of birds, collected from every State and territory of the Union, and from Canada. From the evidence obtained by these elaborate investigations, the Bureau of Biological Survey has proved that the annual loss to the United States, due to the ravages of insect and rodent pests, is 1,000,000,000 dollars.

The survey has shown that thirty-eight species of birds eat the cotton-boll weevil, and that there was not one of these species that was not slaughtered ruthlessly in days gone by. Does anyone believe that the consequent annual loss of 60,000,000 dollars to the cotton crop does not mean an increase in the price of cotton? In Indiana and Ohio, in one year 2,577,000 acres of wheat were destroyed by an irruption of insects, due to the almost total obliteration of their natural enemy—the bird. Does anyone believe that this occurrence did not raise the price of wheat? There are no countries in the world where insects impose a heavier tax on farm products than in many of our overseas dominions. Yet from the trackless forests of Papua round the world both ways, to the sugar plantations of the West Indies, the feather trade is attacking the existence of an immense variety of birds. No species whose plumage is marketable is spared.

Farrer Wheats in Victoria.

In his report on the Wheats competing for prizes at the Royal Agricultural Show, Melbourne, 1913, the Agricultural Superintendent for Victoria, Mr. A. E. V. Richardson, M.A., B.Sc., refers to the changes made in the allocation of prizes for farmers' wheat competitions. The classes are now made much more on the lines which have been adopted at the Sydney Royal Show.

In the "High Strength Red" class the prize was awarded to a magnificent sample of hard red wheat—Cedar—of exceptional strength and milling quality. The sample was extremely uniform, of high bushel weight (69 5 lb.), very attractive in appearance, and gave a loaf of good pile and texture. The winning wheat was grown by Mr. W. H. Scholz, of Gilgandra, New South Wales, on red loamy soil. No manure was sown with the seed, which was sown at the rate of 30 lb. per acre. The yield was 25 bushels per acre.

This exhibit also won the "Champion prize of Australia," as it was "easily the best wheat exhibited in all sections. Its high bushel weight, bright, extremely uniform attractive appearance, and its exceptional milling quality combine to make it stand out prominently from all other varieties shown."

A comparison of this champion wheat with those obtained by averaging the sixteen low strength white wheats entered for competition, and with the Victorian f.a.q. sample for 1912 13, was made, and is as follows:—

Variety.	Bushel weight.	Yield of Flour.	Strength of Flour	Protein Content of Wheat	Gluten Content of Flour.	Percentage of weeds, smut, rubbish, &c.
	lb.	per cent.	Quarts per 200 lb. sack.	per cent.	per cent.	per cent.
Cedar...	68·8	73·03	57·6	11·43	9·71	nil.
Average of 16 samples of low strength wheats.	66 7	71·08	44·1	10·39	7·98	undetermined.
Victorian f.a.q. sample, 1912–13.	63·0	70·92	44·8	10·68	7·81	·74

It will be observed that in yield of flour, strength of flour, protein content of wheat, and gluten content of flour, the average of the sixteen samples of low strength white agree closely with that of the f.a.q. sample. The superiority of Cedar stands out prominently.

As is well known, Cedar is one of Mr. Farrer's creations, and the fact that wheat of this variety won the championship of both New South Wales and Victoria is a sterling tribute to his genius, and to the applicability of his cross-bred to Australian conditions.

Another proof of this is to be found in the fact that the first and second prizes in the "High Strength White" class were awarded for samples of Comeback. The first prize was won by Mr. J. B. Schultz, at Arkona, Victoria, on red loamy soil, and gave a fine yield of 35 bushels per acre on soil manured with 50 lb. of superphosphate per acre. The sample weighed extremely well (68·6 lb. per acre), and gave a good yield of strong flour of excellent baking quality.

Poultry Farming on the Murrumbidgee Irrigation Area.

JAMES HADLINGTON, Poultry Expert.

POULTRY farming is essentially a business that comes within the province of the small landowner of the intensive farming class. It can be made a profitable business by itself, or run as an adjunct to the many branches of agriculture that come within the scope of the small man, more particularly that of fruitgrowing, in conjunction with which it can be worked well. To the man with a young orchard it can often be made a source of profit while waiting for his trees to come into bearing, and perhaps a means of profitable employment for some of his family as they leave school, who will often be found more reliable than the average hired help.

Possibilities at Yanco.

In my travels in this State, nowhere have I been so impressed with the opportunities for poultry farming as are presented at the Murrumbidgee Irrigation settlement. The conditions that appeal to me as offering special inducements for poultry keeping are many, but prominent amongst them are, first, the prospect of feeding cheaply; second, the ideal climate; and third, the uniformity of conditions.

Cheap Feeding.

In regard to this, I consider that lucerne, being one of the crops that can be made a certainty and grown at all times, through the advantage of having water, can be made to constitute a full third of the feed of poultry.

To reduce this advantage to figures, it may be pointed out that 6s. 6d. is approximately the cost of feeding a hen per annum, and one third of this represents 2s. 2d. I take it that maize-growing can be made equally profitable on the area. This, then, can form another third of the total feed required, leaving only 2s. 2d. worth of feed per hen to be purchased. I know it will be pointed out that these products have their value on the farm, and while that is a sound contention, it will still be seen that the value on the farm, and the market value, are quite different, owing to the distance from market. The advantage of converting these into a concentrated product such as eggs, is that the bulk of the middlemen's charges and railway freights is eliminated, and the profits go into the farmer's pocket.

The Climate.

The climatic conditions can scarcely be surpassed anywhere in the world for egg production, certainly not in this State—at any rate, they appear to me to be ideal. A very low rainfall itself is a tremendous advantage, and that, in conjunction with an always available supply of succulent green feed, are two factors which the experienced poultry keeper would consider of the utmost value.

Uniformity of Conditions.

This factor may appear of small moment, but it is of greater importance than might appear on the surface. For instance, for one thing, it is the condition essential for co-operation in matters of both buying, selling, or storing the products. Here, too, is an opening which the Irrigation Commissioner is sure to take advantage of, in order to assist settlers when operations warrant his services in this direction. It is even of greater importance from an educational point of view in matters pertaining to progress in any particular line of business. In poultry keeping the demonstrated success of farms scattered here and there over the area would be the forerunner of progress all along the line of operations, inasmuch as, being under uniform conditions, successful methods at one point would be a practical proof that success was possible on similar lines all over the area.

An Apparent Drawback.

It may be argued that the Yanco settler is handicapped by distance from large markets such as Sydney and Melbourne, but when this is examined in the light of definite knowledge on the subject, this handicap almost disappears, and certainly, to my idea, pales into insignificance compared with the advantages already referred to. In the first place, there is undoubtedly a large market for poultry products in the southern towns, and one which it will take some time to supply, not only from the fact that population is ever on the increase, but, what is of still more significance, it is certain that nothing like the poultry products are consumed that would be the case if supplies were adequate, and more reliable.

Then, again, apart from these markets, there is absolutely no bar to all consignments being profitably sent to Sydney. In my estimation the Yanco poultry-man can feed his hens for 4s. 6d. against the suburban producer's cost of 6s. 6d., and the former can send his eggs to Sydney for 2s. 6d. per thirty-six dozen case, or just under 1d. per dozen, while the suburban producer pays 1s. per thirty-six dozen case, or a third of 1d. per dozen. To make the comparison clear, it means that, taking as a basis 168 (fourteen dozen) eggs per hen, the entire yearly product of a hen can be landed in Sydney from Yanco for 1s. The same product costs the suburban poultry keeper 4d., but since at Yanco the hens can be fed for 4s. 6d. per annum, while it costs the suburban producer 6s. 6d., there is still a balance of 1s. 4d. in favour of Yanco.

The Question of Price

It might then be argued that there is the question of "new laid" prices, but in my opinion this will regulate itself. Certainly a casual sender would not secure "new laid" prices, but there is no reason why the regular sender, who regularly gathers, and carefully grades and packs his eggs, should not score the highest market rates, once he establishes his reputation for sending only fresh eggs. The difference in time between the suburban and Yanco rail journeys for perishable products is not worth taking into consideration, as both should land in Sydney the day after consigning. Commission charges would be exactly the same in both cases.

Approximately the same conditions apply with regard to fowls sent to market. Twelve pairs in Commissioner's crates cost the Yanco producer

8s. 6d. for freight, against 2s. 6d. in the suburbs. It may be pointed out that ten pairs per crate would be plenty for that distance. These two items taken by themselves would appear to handicap the Yanco producer; but here, again, the cheap food factor asserts itself. The cost of production for feed alone in the suburbs may be set down as 3s. per pair to 5 months old, based on prices of feed—pollard and bran 1s., wheat 3s. 6d., maize 4s. per bushel. At Yanco this should not exceed 2s. 6d. per pair, after making a liberal allowance for the fact that lucerne will not be so large a factor in the feeding of chickens as with adult birds. It will still be seen that the difference in the cost of feeding very nearly covers the difference in freight charges. At the same time, I do not wish to make it appear that Yanco will be on quite an equal footing in respect to table poultry with the suburbs, because there are other small factors against it. Still it must be seen that the handicap is not so great but what it will still pay to send poultry to market. In my opinion the Yanco farmer will do well to concentrate on the egg side of the business as being the more profitable.

It should also be noted that cost of feed only is not cost of production, which will include other items such as labour, rent, interest on plant, &c., and will also vary according to the methods adopted in rearing.

Breeds to Keep.

White and Brown Leghorns seem to stand out as the breeds pre-eminently suited to the Yanco settlement. Being egg-producers of the very first rank, these breeds have come to be recognised as essentially the egg-farmer's fowl, especially where climatic conditions are similar to those of Yanco, not only here, but in the United States of America. As an instance of this, at Petaluma, which ranks as one of the largest poultry centres of the world, White Leghorns are the predominating breed. Next to these come the Orpington (Black and Buff), and the Plymouth Rock as a dual purpose fowl, a good layer and table fowl combined.

Here it is well to correct a prevailing impression. It is impossible to get the best table fowl and the best layer in one breed, because the one thing is diametrically opposed to the other. The fowl that runs quickly to flesh is naturally the best table fowl, but it is the fowl that runs less to flesh that is the best layer. It is just as reasonable to expect the best milk cow to be the best beef cow, or the Merino to be the best mutton as well as the best wool sheep, as to expect the best layer to be the best for table. No matter whether pure breeds or crosses are used, the same problem is met; therefore, the dual purpose breed, or strain of a breed, must be accepted as something less than the possible in both respects. In other words, great size is incompatible with high fecundity, just as high productiveness is incompatible with largest size.

Systems of Housing Layers.

There are different systems of housing and running laying hens. First, there is the large flock (free range) system, which requires the least expenditure of capital in buildings, and less labour in attendance. These can

either be housed in small-colony houses arranged at different points of the farm, or in large houses, in convenient positions to accommodate anything from 100 to 250 birds each. A house for 100 would require to be 30 feet by 7 feet, and 7 feet high at front by 6 feet at back, with two roosts running parallel along the house. A house to hold 200 to 250 would need to be about 60 feet by 7 feet, and 7 feet high at both front and back. This kind of housing is suitable for the larger holdings, or in orchards where the birds can be run out. The main thing is, that the houses should not be put *in* the orchard, but *round* it, or they will be constantly in the way of cultivation. Notwithstanding the fact that it may be intended to have them movable, in practice they are always in the way, and the idea of houses in the orchard should not be entertained.

Then again, to properly work this system, a small enclosure in front of each house is a necessity, so that at critical times with the fruit, or when a new lot is brought into these colonies, they can be confined to the enclosure if desired. In this way absolute control is possible. Also another feature is that these enclosures can be used to ensure safety from foxes or other depredatory animals, by simply closing the gate of the enclosure at night.

There is also the small flock system, in which the birds are split up into ten, twenty-four, or thirty-five lots; these can be worked for breeding pens or layers. The best egg tallies are made by hens in small lots; but against this has to be reckoned the extra cost of plant, and much extra cost of labour in attending to the birds. The sizes of house suitable for these numbers will work out approximately as follows:—

A house for ten fowls, 6 feet by 5 feet.

A house for twenty-four fowls, 7 feet by 6 feet.

A house for thirty-five fowls, 10 feet by 6 feet.

The first would have one roost, and the others two roosts, running parallel with the length of the house. The cheapest substantial construction is sawn palings put on the "space and lap" principle, and iron roof. Iron will not be found too hot if sufficient height is given, say 6 feet at the front and 5 feet at the back in small houses, and 7 feet front and 6 feet back in large houses. An open front and a ventilation space at the back will enable the hot air to be carried off. All houses should have wire fronts for convenience, to enable birds to be shut up in the house when manipulation is necessary. In view of the possibility of fowl tick, iron could be used in the construction of the houses, but it would need to be painted to keep them cool enough. Another factor should be kept in mind. It is not likely that many settlers will be able to give sufficient shade in the early stages of their development; therefore, it is the more necessary that the houses be constructed with a view to coolness.

Fowl Tick.

If proper poultry houses are constructed, and ramshackle buildings of all kinds avoided, there is absolutely no reason to fear infestation of this pest provided proper steps are taken to combat it from the start. It will be found easier to keep clear of it than to get rid of it.

Seasonable Work for Poultry Keepers.

JAMES HADLINGTON.

JANUARY.

MOST of the work as outlined in the last two issues will still occupy the attention of poultry keepers, particularly that relating to growing stock in the notes for November

The hot summer months are now with us, and the losses often experienced by poultry keepers during heat waves that occasionally occur call for some advice upon how to minimise the baneful results of these visitations. We are accustomed to being told to supply plenty of shade for the birds, and are led to believe that if this is done all will be well; but the provision for shade, while commendable and necessary, barely touches the main cause of losses in poultry during these periods of extreme heat. It goes without saying that ample shade is necessary, but to get at the real trouble we must dig deeper into practical experience. Shade itself will not ensure fowls from the disastrous effects occasioned when the thermometer rises to 106 and upwards. Similar losses occasionally occur at lower temperatures if there is great humidity.

Watering Arrangements.

In the first place, it is very necessary to have the water supply so complete that the birds are never at any time short in this respect. This applies to any weather, but more particularly to times of great heat, because, if they are left alternately without water and then supplied freely, and this happens on the top of their feed, distended crops will result. Nearly all the crop troubles of poultry result from careless and unmethodical watering; over-distended and ruptured crops are mostly the result of water after feed.

Feeding during Heat Waves.

When great heat is anticipated it is a good plan to drop out the morning mash and substitute boiled or steamed wheat and feed sparingly. What happens after the feed of mash on a hot day is that when the birds drink too much warm water fermentation is set up in the crop—a condition which lasts all day. This is the cause of more than half the deaths in poultry ascribed to heat apoplexy.

Another Source of Trouble.

Another prolific source of trouble is that, no matter how much shade is provided, the birds distressed by great heat will crowd into almost anything in their efforts to get relief, and the nest-boxes, or any such arrangements, only prove death traps on these occasions. A sharp lookout should therefore be kept to see that the birds are not crowding into them, and during the worst hours water should be hosed or thrown about where the fowls are congregated; and it is advisable to have a cask or tank of water ready in

which to dip any that are getting overcome by heat. Very few fowls need be lost if these precautions are taken.

Nature and Prevention of Chicken-pox ("Warts").

This disease is generally ascribed to bites of mosquitoes and is believed by some to be the sole cause of the malady; but this is not so. The so-called "warts" are proved, both by practical experience and scientific investigation, to be "chicken-pox," a specific disease, just as is small-pox and chicken-pox in human beings. Practical experience has shown that it is preventible in poultry, mosquitoes notwithstanding—at any rate so far as any ill effects are concerned. It is admitted that mosquitoes play their part in its dissemination once it prevails amongst an unprotected flock. The only question that is still in some doubt is whether the mosquitoes actually carry the infection, or whether the punctures made by the mosquitoes allow an opening for the infection to reach the blood, and more readily induce the infection. But my observation is that the mosquito is not necessary to an outbreak of the disease, inasmuch as outbreaks occur where mosquitoes are not present. In these cases the first signs of the disease are yellowish-looking blebs, varying in size from a pin's head to a split pea, about the combs and wattles of the birds. It is just as certain that a place can be swarming with mosquitoes without any appearance of the disease, even in the season for it (February to May in this State). Therefore, the mosquito, as a cause, must be acquitted—in fact, I have never entertained this idea, while hatching and rearing many thousands of chickens in mosquito-infested localities. I have only experienced one outbreak of this disease of any importance, and that was in a year in which the usual protective measures were not acted upon. This was some dozen years ago, and yet mosquitoes have been numerous each year.

Prevention.

The protective measures are very simple, but must be faithfully carried out, and commenced at the right time. To be effective, about the first week in January, Epsom salts, or flowers of sulphur, should be given twice per week. The best way is to put one ounce of Epsom salts in a gallon of drinking water every third day, for two or three weeks, then alternate this over the same period with flowers of sulphur, at the rate of one ounce to 50 adults (birds of five months of age, and over), every third day in the morning mash. This should be persevered with during the "wart" season, say, to the first week in April. This method of treatment is necessarily worked out on an adult basis for convenience in adding the sulphur to the feed, but it will be understood that the various ages will naturally get their proper proportion of the sulphur.

Chicken-pox, as its name suggests, is almost exclusively confined to young growing stock. Late chickens, doubtless owing to a low vitality, are most susceptible to it. The older birds scarcely ever suffer from it. At the same time, the sulphur is most beneficial to them during this period, as it is the moulting season. I give no scientific explanation why this remedy should prove protective, but there is ample practical evidence that it is so.

Experimental Feeding with some Alleged Poison Plants of New South Wales.

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FROM time to time various reports have appeared dealing with plants deleterious to, or supposed to be deleterious to, stock of various kinds. The most notable contributions have been from Mr. J. H. Maiden, the Government Botanist of New South Wales, and from Messrs. F. B. Bailey and Gordon, of Queensland. These authorities have collected together numerous references to the reputed poison plants of Australia, systematically arranged according to their natural orders.

In using the list of plants collected by the above-mentioned authors, which have been considerably added to by other contributors, it is found that in a number of instances it is more a matter of suspicion as regards the plant incriminated rather than any actual proof that it is responsible for the harm resulting. Since it is hard often, when insufficient information is available, to differentiate illness or death resulting in some way from the ingestion of poison plants from illness or death due to the action of micro-organisms, it is probable that it has frequently happened that deaths really due to the one cause have been attributed to the other, and *vice versâ*. Animals, for instance, suddenly dying from anthrax, may be suspected to have fed upon an intensely poisonous weed, and similarly, two or three sudden deaths from a poison plant may be attributed to anthrax. Unfortunately, very few of the alleged poisonous plants of Australia have been systematically experimented with; the result is that much material has to be dealt with in a microbiological laboratory which is probably not associated in any way directly with micro-organisms. Were our poison plants and their attributes better known in many cases, then perhaps these obscure illnesses and deaths could be sheeted home to their actual cause. This would tend to lessen considerably the routine labour of laboratory work. With this object in view, and in the hope that any work undertaken in regard to poison plants might eventually lessen the labours the Microbiological Laboratory is called upon to undertake in investigating these obscure diseases, the opportunity was taken to carry out certain experiments at Milson Island, with such plants as were available in the district and were on the black list as having been suspected of being poisonous.

The accompanying paper is a short summary of the results of these experiments, which appear to have been the means of eliminating from the black list a few plants on which suspicion had formerly rested. A note of warning must, however, here be given, namely, that though the plants did

not prove poisonous under the conditions of the experiment and in the amounts given, it does not necessarily follow that under other circumstances they might not be deleterious.

Order Dilleniaceæ.

Hibbertia diffusa.

It was noticed on Milson Island that a small Hibbertia with rather large spathulate leaves and large yellow flowers was left quite untouched in the rabbit paddock in which all other plants were eaten off. This suggested that possibly the plant might contain some poisonous constituent. In consequence, the following experiments were conducted:—

Sheep.—A sheep was fed from 11th March to 14th June, almost daily, the amount eaten varying from about 2 oz. to, later, 6 oz. No ill effects were noticed.

Rabbits.—Four rabbits were also fed upon the plant. The first died suddenly after fifteen days' feeding. The second seemed to be paralysed after eleven days' feeding, and shortly afterwards died. The third was fed from 15th April to 27th April, and again on 30th April, 1st May, and 3rd to 9th May, on which latter date it died—the control rabbit also died on this date. The rabbit experimented on seemed paretic in its hind legs for two days before it died. A fourth rabbit was fed almost daily from 5th July to 14th July, 1912, and on 15th July it died.

Comment.—These experiments suggest that though this plant eaten in small quantities is not poisonous to sheep, it is injurious to rabbits.

Order Euphorbiaceæ.

Omalanthus populifolius- Native Poplar.

Maiden (*Agricultural Gazette* of New South Wales, Vol. 8, Part 1, January, 1897, p. 18) quotes Baron von Mueller as stating in the *Australasian Chemist and Druggist*, September, 1883, that cattle succumb to the effects of this plant, the final cause of death being hæmaturia. In the *Garden and Field* for 1894, p. 243, Mr. Maurice Holtze considers that this plant causes redwater in the Northern Territory; but he has evidently confused redwater due to tick fever with the South Coast redwater of this State.

Experiment at Milson Island.—A calf was fed from the 10th June, 1912, almost daily, till 18th October, 1912, with the leaves of this plant gathered fresh on the Hawkesbury River. The amounts given varied from 10 to 24 oz. daily. The plant was cut up and given with other food. No ill effects at all were detected.

Comment.—The amount given daily to this calf is probably more than would be eaten by any animal under natural conditions. It seems certain that this plant does not cause redwater in cattle, and it seems unnecessary to continue further experiments.

Order Leguminosæ.

Indigofera australis—Native Indigo.

This plant has been suspected also as being the cause of South Coast red water in cattle.

Experiment at Milson Island.—From 10th June, 1912, till 21st November a calf was fed almost daily with the leaves of this plant. The amount eaten daily varied from about 6 oz. to 30 oz., the usual amount eaten being about 12 to 16 oz. No ill effects at all were noticed.

Comment.—The amount of this plant eaten daily is probably more than would be taken by an animal under ordinary circumstances. It would seem certain that this plant does not cause redwater in cattle. Under the conditions of the experiment, also, it may be noted that fresh material was obtained almost daily in the Hawkesbury River district. The plant does not seem in any way injurious to stock. It may, of course, happen that occasionally the plant may contain hydrocyanic acid, or, when specially luxuriant, may give rise to a tendency to hoven; but it seems certain that it does not contain, in an amount sufficient to cause symptoms, any other definite poisonous body.

Order Santalaceæ.

Exocarpus cupressiformis, R.Br.—Native Cherry

Maiden (*Agricultural Gazette* of New South Wales, Vol. 8, Part I, January, 1897, p. 20) quotes Woolls as saying that branches of this plant produce cerebral disease in horses on the Castlereagh.

Experiment at Milson Island.—A sheep was fed almost daily from 11th March, 1912, till 6th June, other food being given in addition to the branches of this plant. On 6th June the sheep was butted by a cow, and died the next day, death being entirely attributable to this accident. No ill effects were noticed from the feeding.

Comment.—It would seem from this experiment that this plant is not poisonous in any way to sheep, and probably to other animals as well. The evidence on which it has been incriminated seems hardly sufficient to require a repetition of this experiment.

Order Cucurbitaceæ.

Cucumis myriocarpus—Small Wild Melon.

From time to time considerable suspicion has been attached to this plant. Unquestionably the stringy nature of its stems may tend to produce impaction. Apart from this, however, it has been suggested that some poisonous principle exists, especially in the fruit, and also that this poison may be responsible for the peculiar attacks of blindness in horses in the extreme western parts of New South Wales.

Experiment at Milson Island.—A bull calf was fed with twenty-five of the fruit cut up, and given as a drench, on 4th April; on 5th April he was

drenched with fifty-five melons, on 16th April with 100 melons, on 30th April with 100 melons, on 1st May with 100 melons, and on 2nd May with 100 melons. No ill effects were noticed.

Comment.—It seems certain that, even in as large a dose as 100 melons, sufficient poison is not present to injure a calf.

Order Lobeliaceæ.

Lobelia purpurascens.

This little Lobelia is common in places, and, though not being large in size, has a succulent leaf. As it belongs to a Natural Order containing amongst its members poisonous plants, it was subjected to investigation.

Experiment at Milson Island.—Three rabbits were fed daily with a small quantity of this plant. One died in thirteen days, but another experimental rabbit also died on the same day, and death was probably not due to the plant eaten. Another rabbit died on the 6th day after feeding started. The third rabbit was fed from 15th April till 28th June almost daily, the amount taken being on an average from 2 to 3 oz. It remained perfectly well.

Comment.—Though two of these rabbits died, the deaths cannot be certainly attributed to the Lobelia. The fact of the third rabbit eating the plant for a considerable period without showing ill effects seems to exclude this plant as being a definitely poisonous one.

Order Cycadeæ.

Macrozamia spiralis.

Numerous references occur to a disease popularly called "rickets," attributable to feeding on the leaves of species of Macrozamia, both in New South Wales and in Western Australia. Professor Stewart, then an officer of the Veterinary Department of this State, was able some years ago to produce the disease on the twenty-third day by feeding cattle on an average of about 2 lb. a day.

Experiment at Milson Island.—A cow was fed with Macrozamia leaflets which were cut up into small pieces by means of scissors and mixed with chaff, from 13th June, almost daily to 4th December. The amount eaten was usually about 1 lb., varying occasionally up to 30 oz. During this period no ill effects at all were noticed. The animal was well fed after it had eaten the Macrozamia leaflets.

Comment.—It would seem from this experiment that an animal eating daily about 1 lb. of Macrozamia leaflets, supplemented by other nourishing food, does not develop "rickets." The amount given was less than the experimental amount of 2 lb. a day given by Professor Stewart. If, however, the Zamia contained any active poisonous constituent, one would think that a pound eaten daily for a period of five months would manifest some signs of its action. This, however, was not the case. It is probable that cattle in very poor country, being half-starved, will eat the plant, and I am inclined to think that manifestations of the disease are not so much due to any definite poisonous body in the plant as to the fact that the mixed food

taken by these animals on such poor country, though sufficient to prevent them from dying, is lacking in some constituent necessary for the proper nourishment of the nervous system. My experiments seem to suggest that, as in scurvy and beri-beri in man these conditions are due to the absence of some body—vitamin—in small amount, so perhaps in these half-starved animals the absence of a similar constituent is the cause of the trouble. If such be the case, one would naturally not expect to produce the disease in animals receiving other abundant nourishing food.

This experiment might perhaps be repeated with advantage.

Order Liliaceæ.

Xanthorrhœa sp.—Grass-tree.

"Cattle at Karuah said to become crampy. The cattle swell in the legs, fall off in condition, and continue unthrifty, even some of them dying. If removed to good, sound country, they do well."—*Agricultural Gazette*, New South Wales, 1899, p. 859. In reference to this statement, Mr. Pottie, then Lecturer in Veterinary Science at the Hawkesbury Agricultural College, is reported as saying that conditions identical with those described are produced in cattle which eat the young shoots of the grass-tree after rain. He says that the shoots contain a resin, and the effects upon the animal's system are loss of appetite, condition, energy, and vitality, followed by weakening of the hind quarters, which eventually become paralysed, the animal dying of exhaustion and exposure.

Maiden (*Agricultural Gazette*, New South Wales, Vol. 8, Part I, January, 1897, p. 22) quotes J. S. Allan as saying that the settlers in the vicinity of Jervis Bay had informed him that the shoots of the grass tree, when in blossom and eaten by cattle, give them a complaint called "cripples." It appears to affect their joints, and doubles them up.

Experiment at Milson Island.—A calf was fed from 5th November, 1912, till 2nd May, 1913. It was given from 1 lb. up to 32 oz. almost daily for the period. During part of the time, at the beginning of the experiment, the young shoots were taken from flowering plants, and portion of the flowering stem was also used. Later, when the flowering was over, just the young leaves were cut up and given. The animal was also given lucerne hay in the morning, the grass-tree being cut up and mixed with chaff in the evening. The animal ate the grass-tree well. No ill effects were noticed at any time.

Comment.—This experiment does not support the view that the condition referred to was due to the eating of grass-tree leaves. It does not quite exclude the possibility under the special circumstances mentioned by the recorders, namely, young shoots in plants which are flowering, and young shoots after rain. It seems, however, hardly worth while to repeat experiments of this nature. It is probable that cattle only eat the leaves when there is a scarcity of other more natural fodder, and the symptoms are perhaps explainable on the fact that all necessary sustenance is not contained in the food they have access to under these circumstances.

To the Members of the Agricultural Bureau of New South Wales.

GREETING.

I wish to offer congratulations to the members of the various branches of the Agricultural Bureau respecting their achievements during the year just closed. A review of the work shows that 29 new branches have been established, and the total number of branches is now 81, with a membership of 2,672.

A step in the right direction has been taken by a number of branches in the way of co-operating in the purchase of farming implements and materials.

Even a keener interest than in previous years is now being evinced by members in matters pertaining to their respective branches of agricultural industry, an interest which in many cases amounts to enthusiasm.

On behalf of the Minister and the officers of the Department of Agriculture, I convey to members of all branches, hearty greetings and good wishes for the year just commenced, and sincerely trust that their efforts will assist in bringing agricultural education up to that high standard towards which we all aim.

George Valder

Acting Under Secretary, and
Director of Agriculture.

Sydney, 2nd January, 1914.

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

Branch.	Honorary Secretary.
Albury	Mr. J. D. Lankester, Albury.
Baan Baa	Mr. P. Gilbert, Baan Baa.
Balldale	Mr. H. Elrington, Balldale.
Bathurst	Mr. J. McIntyre, Orton Park.
Batlow	Mr. A. C. Arnot, Batlow.
Beckom	Mr. S. Stinson, Beckom.
Bonville	Mr. H. B. Faviell, Bonville.
Borambil	Mr. H. A. D. Crossman, "Homewood," Quirindi.
Bungalong	Mr. G. H. Pereira, "Springdale," Cowra Road, *viâ* Cowra
Canadian	Mr. C. Smith, Canadian Lead.
Cardiff	Mr. F. B. Cherry, Cardiff.
Carlingford	Mr. D. K. Otton, Carlingford.
Collie	Mr. C. J. Rowcliff.
Coonabarabran	Dr. F. G. Failes, Coonabarabran.
Coradgery	Mr. G. C. Harris, Wallandra, Parkes.
Coreen-Burraja	Mr. N. B. Alston, Coreen, *viâ* Corowa.
Cowra	Mr. E. P. Todhunter, Cowra.
Crudine	Mr. F. W. Clarke, Crudine.
Cundletown	Mr. S. A. Levick, Roseneath, Cundletown.
Deniliquin	Mr. W. J. Adams, jun., Deniliquin.
Derrain	Mr. A. P. Hunter, Red Bank Creek, Matong.
Dubbo	Mr. T. A. Nicholas, Dubbo.
Dunedoo	Mr. G. E. Alexander, Dunedoo.
Erudgere	Mr. Frank Hughes, Erudgere.
Fernbrook	Mr. W. Marks, Yarrum Creek, Dorrigo.
Forest Creek	Mr. W. Thompson, Forest Creek, Frogmore.
Garra and Pinecliff	Mr. A. S. Blackwood, "Netherton," Garra, *viâ* Pinecliff.
Gerringong	Mr. J. Miller, Gerringong.
Grenfell	Mr. G. Cousins, Grenfell.
Gunning	Mr. E. H. Turner, Gunning.
Henty	Mr. H. W. Smith, Henty.
Hillston	Mr. M. Knechtli, Hillston.
Inverell	Mr. W. A. Kook, Rock Mount, Inverell.
Jerrara	Mr. A. O. Lane, Public School, Mullengrove, Wheeo.
Jiggi	Mr. D. Gibson, Dairy Farm, Jiggi.
Jindabyne	Mr. Sylvester Kennedy, Jindabyne.
Katoomba	Mr. C. Wooller, Oliva Park Farm, Katoomba.
Keepit, Manilla	Mr. J. B. Fitzgerald, Keepit, *viâ* Manilla.
Kellyville	Mr. Joseph Nutter, Kellyville.
Kenthurst	Mr. J. R. Jones, Kenthurst.
Leech's Gully	Mr. J. Donnelly, Leech's Gully, Tenterfield.
Little Plain	Mr. F. S. Stening, Little Plain, *viâ* Inverell.
Lower Portland	Mr. W. C. Gambrill, Lower Portland.
Mangrove Mountain	Mr. G. T. Hunt, Mangrove Mountain, *viâ* Gosford.
Martin's Creek	Mr. P. Laney, Martin's Creek, *viâ* Paterson.
Middle Dural	Mr. J. W. Thacker (*pro tem*), Middle Dural.
Milbrulong	Mr. O. Ludwig, Milbrulong.
Moruya	Mr. P. Flynn, Moruya.
Narrandera	Mr. C. F. Pearce, Narrandera.
Nelson's Plains	Mr. V. Schlaadt, Nelson's Plains.
New Italy	Mr. F. A. Morandini, New Italy.
Nimbin	Mr. J. H. Hutchinson, Nimbin.
Orangeville	Mr. C. Duck, Orangeville.
Orchard Hills (Penrith)	Mr. H. Basedow, Orchard Hills, *viâ* Penrith.
Parkesbourne	Mr. W. H. Weatherstone, Parkesbourne.
Peak Hill	Mr. A. B. Pettigrew, Peak Hill.
Penrose-Kareela	Mr. L. Pieremont, "Vila," Penrose.

Branch.	Honorary Secretary.
Ponto	Mr. A. D. Dunkley, Ponto.
Redbank	Mr. J. A. Graham, Woodlands, McAlister, *viâ* Goulburn.
Ringwood	Mr. Wm. Tait, Ringwood.
St. Mary's	Mr. W. Morris, Queen and Victoria Streets, St. Mary's.
Sackville	Mr. Arthur Manning, Sackville.
Sherwood	Mr. J. E. Davis, Sherwood.
Stockinbingal	Mr. J. Neville, Stockinbingal.
St. John's Park	Mr. J. C. Scott, St. John's Park.
Tallawang	Mr. J. E. Hansall, Tallawang.
Taralga	Mr. Dave Mullaney, Stonequarry, Taralga.
Toronto	Mr. J. G. Desreaux, Esmond, Toronto.
Tumbarumba	Mr. R. Livingstone, Tumbarumba.
Upper Belmore	Mr. A. W. Fowler, Upper Belmore.
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Wagga	Mr. Thos. Fraser, Aberfeldie, Wagga.
Walla Walla	Mr. H. Smith, Walla Walla.
Wallendbeen	Mr. W. J. Cartwright, Wallendbeen.
Walli	Mr. A. V. Bloomfield, Walli.
Wetherill Park	Mr. L. Rainbow, Wetherill Park.
Wollun	Mr. C. E. Burke, Private Bag, Wollun.
Wolseley Park	Mr. H. McEachern, Wolseley Park.
Wyan	Mr. C. W. Harper, Myrtle Creek Railway Station.
Wyong	Mr. Edgar J. Johns, Wyong.
Yass	Mr. Cyril Ferris, Yass.

Notice to Honorary Secretaries.

It is important that a record of the meetings of the branches should be inserted in the *Agricultural Gazette*, and honorary secretaries are invited to forward to the Department a short account of the proceedings of each meeting, with a brief summary of any paper which may have been read, and the discussion that followed it, as early as possible after each meeting. Notes for insertion in the *Agricultural Gazette* must reach the Department before the 16th to ensure insertion in the following month's issue.

Insect Pests.—Quite a number of the branches have availed themselves of the Department's offer to supply a set of insects, being the common pests of the district, and the collections are now being cased. The Government Entomologist suggests that as each district has certain pests peculiar to its orchards and gardens, more useful work would be done if the members themselves collected the local pests (orchard, garden, and stock) and sent them to the Department, where they would be arranged, mounted, a descriptive label attached, and returned to the branch. Mr. Froggatt considers that such a collection would have a far greater value, as there would be more interest attached to the specimens when the members knew exactly where the pests came from, and where and how to find them.

Demonstrations in Clearing Land and Subsoiling with Explosives.

A limited number of demonstrations in clearing land and subsoiling with explosives will be given by Mr. H. C. Coggins, Assistant Inspector of Agriculture, to branches of the Agricultural Bureau. Branches who wish to take advantage of this offer are requested to make early application to the Department through their honorary secretaries.

Veterinary Lectures.

In connection with the lectures to branches of the Agricultural Bureau, it is herewith pointed out for the information of honorary secretaries that the following is the list of subjects of lectures which can be delivered to them :—

Horses.—(1) Conformation and Unsoundness (with lantern illustrations); (2) Colic and Treatment of Wounds; (3) Strangles, Influenza, and Tetanus.

Cattle.—(1) Tuberculosis (with lantern illustrations); (2) Contagious Abortion and Contagious Mammitis; (3) Ticks, Tick Fever, Tick Infestation and Eradication.

Sheep.—Parasitic Diseases of Sheep.

Pigs.—Diseases of Pigs.

General.—(1) Parturition of Farm Animals (with lantern illustrations); (2) Feeding of Farm Animals and Dietetic Diseases; (3) Sterility: Causes and Treatment in all classes of Stock.

Bee-keeping.

A series of lectures on bee-keeping is being arranged by Mr. R. G. Warry, Instructor in Apiculture. Secretaries, whose branches intend availing themselves of this opportunity to receive a practical insight into this branch of agriculture, are requested to make early application.

REPORTS AND NOTICES FROM BRANCHES.

Batlow.

The following is the paper by Mr. A. C. Arnot, Hon. Secretary, for which space could not be found in our last issue.

After a vote of thanks had been passed to Mr. Arnot for his paper, the Chairman declared a most successful meeting closed.

A Trip through the Orchards of Tasmania and Victoria.

The first thing that impresses an orchardist from this State when visiting Tasmani is the closeness of the planting. The average distance apart there for apples and pears is 12 feet to 18 feet, with 15 feet as the most popular distance.

The soil in most districts is much poorer than in a district like Batlow, and it is this fact that makes the closer planting practicable. The orchardist can cut back his trees hard without running the risk of producing nothing but wood. Indeed, hard pruning on poor soil produces fruit spurs. On rich soil such as our own it only causes wood-growth, and fruit spurs can only be obtained by light pruning or by letting the leaders go unpruned now and again. The advocates of close planting claim the following advantages for their system:—The trees shade the ground and thus help to conserve moisture; they are not so affected by windstorms; they say that they obtain a higher price per case for medium-sized apples than for large ones, and that close planting produces them quite large enough; and, finally, that the profit per acre from close planting is larger than when the trees are further apart.

The soil in the great orcharding centres of the Huon, Derwent, and Tamar is a light, sandy loam merging in places into almost a pure sand, overlying a yellow clay subsoil. This latter is most important. Where the subsoil has not a good proportion of clay the trees invariably do badly and soon die out; whereas with a good clay subsoil the trees do pretty well, despite the poorness of the top soil. Thus the orchardist can put to profitable use soil which would be useless for the farmer. I saw only one orcharding district where the soil was not of this character. This was the Bagdad Valley where the soil is a rather rich, black, clay loam. The trees here grew stronger than elsewhere, were planted further apart, and bore more heavily.

The North-west Coast of the island mostly consists of a deep rich chocolate red soil, similar to that at Batlow only much deeper. This is where the famous potatoes come from, but very little fruit growing is done on this soil as it is too rich. In the older established orcharding centres such as the Huon, one is greatly struck by the slovenly methods employed by many of the orchardists, although, of course there are many men who are very up to date.

The orchardists are adopting the numerical pack. It is impossible to describe this pack here, but in my opinion it is by far the best. Several of them grade their fruit by machine, but the general idea appears to be that one should not use a grader provided one can secure the services of a first-class packer who can grade by eye. With a grader the most inexperienced can pack well and quickly. For the numerical pack it is most important that fruit should be graded accurately, *i.e.*, to ⅛ inch, but Mr. Samson, an American packer, whom I saw giving a demonstration, prefers to grade by eye, as he thinks there must be some bruising. In one large shed at Huon the following was the method of handling the fruit:—There is a large shed 60 feet x 30 feet with an additional 20 feet x 20 feet for the waggon, so that the loading can be conducted in all weathers. There are doors at both sides. The cart at one door delivers the fruit picked loosely into bushel cases. It is placed on a trolley and wheeled over to the grader, where it is stacked, and when it is decided to pack the fruit it is run through the grader. It can then either be packed straight from the machine or else put into cases loosely but carefully, and packed from thence. Wrapping paper is used by most growers. It enhances the appearance of the fruit, prevents rot spreading, and maintains a more even temperature; it costs about 2d. a case.

The most troublesome orchard disease in Tasmania is Black Spot. It causes far greater losses than Codlin Moth. The treatment is to spray with either Bordeaux mixture or lime-sulphur wash just when the buds are bursting and showing pink. The latter spray is coming rapidly into favour, especially in Victoria. It is usual to spray three times for the moth. A method of keeping down the moth which seems to promise well has been discovered by the Principal of Burnley Horticultural Gardens, Victoria. He hangs a bottle containing some preparation in the tree, and the moth is attracted and killed by it. The best orchards are winter-sprayed with red oil or lime-sulphur wash to kill San José scale, red spiders, &c. There is none of the former in Tasmania, and rigorous precautions are taken to keep it out.

The favourite varieties of apples in Tasmania are Sturmer Pippin, Cleopatra or New York Pippin, Jonathan, Five Crown, French Crab, and Scarlet Nonpareil, a small, brilliantly coloured apple which has not done well on the mainland. Cleopatra is commencing to fall into disrepute owing to its liability to every kind of disease. In the South, Jonathan does not colour well, and consequently is not the prime favourite it is in the North. In the South, Sturmer is probably the most popular apple. It is justly called "the poor man's apple," for it crops heavily every year on short spurs, keeps very late, and sells well in October when the other apples are done.

Other favourite sorts are Crofton, a very good small late dessert apple, Allington Pippin, Alexandras, a large red cooker, and Adams' Pearmain. Granny Smith is not known.

The favourite pears are Winter Cole, Winter Nelis, Beurre Bosc, Williams, Josephine, and Napoleon. Dr. Benjafield's pear orchard near Hobart yielded between £200 to £300 worth of pears per acre off 16 acres. He cool-stores and says he averages 15s. per case. He has about thirty varieties, and is a firm believer in the advantages of inter-pollination.

Very few prunes are grown in Tasmania and Victoria; in fact I did not see one tree. For picking fruit, the apron with removable bottom seemed to me the best method.

Pruning is conducted on the same principles as in this State. The laterals of such varieties of apples as Jonathan, Irish Peach, &c., are left long until fruit-spurs form; then they can be cut back. If cut back before, they only throw out a wood shoot or else die. The laterals of such varieties as Five Crown, Sturmer, &c., can be cut back or else cut right off as the tree bears quite heavily on the short spurs which clothe the main arms. They can, however, be treated like Jonathan if the grower prefers. The laterals of most pears should be left long until fruit-spurs form.

One grower who has a very old orchard, with trees close and interlacing, told me that he had rejuvenated it by ploughing very deep with heavy disc plough which cut the roots. They then sent forth new fibrous roots, and he said they did not sucker. He has tried various devices for making trees bear, and got excellent results from pears which have previously refused to bear, by nearly ringbarking them or by twisting a wire around the trunk. Another way he made a stubborn tree bear was to weight the branches so that they hung back to the ground. The flow of sap is thus checked and spurs are formed.

The jam and drying factories which are found in most of the Tasmanian orchard centres are a great assistance to the grower. It costs the Huonville grower 2s. 8d. per case to land his fruit in Sydney or Brisbane, and 5s. in London, and it is the practice of the big growers to send half their stuff to either Sydney or Brisbane, or both, and half to London.

There is more planting going on now on the Tamar than anywhere else in the island. A trip up the river is a beautiful sight with the orchards sloping down to the water on both sides. There is no danger of frosts here, and the fruit colours well. In winter however, fogs are very bad, and make things very disagreeable.

The Victorian orchards are planted further apart than the Tasmanian, 18 feet being about the average. At Doncaster, a few miles out of Melbourne, a lot of irrigation is done from dams. Pines are grown very extensively as wind breaks, as the district is not naturally sheltered like most of the Tasmanian orchards.

Mr. Stephens, at his orchard at Healesville, has installed a cool store on the most up-to-date lines within the packing shed, which is much handier and altogether preferable to having two separate buildings. The ammonia machine is driven by a gas engine, and the cool air arises through cracks in the floor and passes out through similar vents in the roof. Spaces are left between the cases to permit of free circulation of air. The apples are brought straight in from the trees and packed loosely in cases. The temperature is kept about 34 deg. Fah., and the fruit is kept until January. The whole orchard is tile-drained.

A disease which has attacked the Five Crown apple was very bad in this orchard. It is called "pig-face" or "crinkle," and consists of a crinkle in the skin under which the apple is discoloured. This disease seems to be a sap trouble, and a first cousin to bitter pit; spraying does no good. One thousand cases of Five Crown alone were damaged in this orchard, or more than half the crop of that variety. Together with the other waste fruit these were crushed for the juice which was sent to the cider factory, and about 10d. or 11d. per bushel was thus netted. A machine for cutting up the apples costs £16, whilst a small crusher for eight cases costs £10, and a large one for sixty cases £80. The juice is sent in barrels, which are returned. Another way to dispose of one's waste fruit is to dry it, whilst in some districts there is the jam or drying factory.

The rainfall throughout the districts I visited varied from 20 to 40 inches per year, being lightest near Hobart and heaviest on the Huon. The sandy soil, however, retains the moisture well. I had the pleasure of going round with the judge at the Bagdad Valley Show whilst he was performing his duties. He was very strict in ruling out any fruit which showed the slightest disease, or which was without its stalk. He cut several apples, especially Cleopatras and Five Crowns, which were subject to mouldy core, and if they were faulty, out they went, however prepossessing externally and true to type they were. Several exhibitors lost points by exhibiting as dessert fruit apples which were too large, although otherwise perfect.

Most growers used either wood wool, or a corrugated cardboard which costs about 3s. per hundred sheets. As two sheets are used in a case the cost was about ¾d. per case.

All the best growers have some distinctive brand, which they endeavour by honest practice and good packing to make well known in the markets. The produce of many such growers is sold on the brand alone, the buyer not bothering to open the case.

Besides this brand, the cases are all branded with the variety of the fruit and quantity, thus, "1 bushel apples, F.C." (French Crab), or "F.C.P." (Five Crown Pippin), etc.

The practice of branding the exact number of apples on the outside is rapidly growing in favour. It is readily calculated, especially if the numerical pack be adopted, and enables the agent to obtain for the grower a better price than he otherwise could.

I returned to Batlow with a firmer belief than ever in the future of the fruit industry, for everyone who was in a position to know spoke glowingly of its prospects, seeing that as yet Europe has hardly been touched. Then there is India and the East as well as other markets. Moreover, England has not been worked scientifically, for too much fruit has been sent to London, instead of sending a big proportion direct to other cities, and last, but not least, there is the American market which, when the Panama Canal is opened, will be most profitable, as it will be possible to ship direct to New York in the off season.

Mr. C. Smith remarked that he had known an old pear-tree which had not borne previously, brought into bearing by a bush fire which checked the sap.

Mr. Dodds emphasised the need in the near future of a jam and canning factory in the district. He thought that one could be run on co-operative lines.

Mr. Barberie also advocated co-operation, pointing out that an association had recently been formed to promote the interests of the grower in regard to selling his fruit, and in buying trees, spraying materials, cases, wood wool, etc., which were all to be supplied as cheaply as possible. He promised to read a paper on "Co-operation" at the next meeting of the Bureau.

Canadian.

There was a good attendance at the monthly meeting of this branch on the 8th November.

A discussion took place on varieties of wheat, methods of cultivation, and results from manuring. Mr. Pascoe's experience on light soil was that the land should be fallowed early, ploughing well and deep, and turning in as much as possible of stubble and

preferably any kind of green herbage or grass. He had obtained the best results with Federation for grain; with superphosphate he obtained a yield of 20 bushels per acre, while unmanured land was practically a failure.

Mr. TAYLOR asked Mr. PASCOE if, before manuring his land, he found out in what content it was deficient. The reply was that the soil was analysed, and was found very deficient in potash and slightly deficient in phosphates.

Mr. STREHER had half of one paddock fallowed in November, 1912, the whole paddock being ploughed in May last and sown with Marshall's No. 3. The fallowed half was estimated to yield 30 bushels, and the other half only 12 to 15 bushels per acre The fallowed land was free from oats, but the other portion was very dirty with oats. He considered that this variety of wheat was very suitable for any soil for hay or grain; also that it was an easy wheat to harvest and non-shelling in the standing crop.

Mr. BEAUCHAMP also advocated the deep tilling of the land. The richer the soil the deeper the ploughing should be.

Cardiff.

This branch held its annual meeting on 8th November, when the Hon. Secretary reported upon the work done during the previous twelve months.

Twelve meetings were held; demonstrations in pruning, and in clearing and subsoiling with explosives were given by officers of the Department of Agriculture. A demonstration of spraying with "Gargoyle" was also given by the Vacuum Oil Company. The demonstrations in each case were well attended.

Coonabarabran.

Members of this branch, at the meeting held on 1st November, discussed the three useful papers that are given below.

An innovation which might be followed by other branches with advantage, is the inclusion by this branch in its business for next meeting of a "question box." Every member is invited to write on a slip of paper a question or the name of a subject relating to farming or grazing, in which he is interested, or upon which he would like advice. The slips of paper will be put in a hat, and the subjects discussed as the slips are drawn.

The first of the three papers read was by Mr. J. W. Nelson.

POULTRY KEEPING.

The shedding system of keeping poultry, which is now being largely adopted in Australia, has quite dispelled the idea that a large section of land is essential where fowls are to be kept as an industry. An allotment of land 60 x 10 feet is quite capable of accommodating 100 fowls with room to spare. Thus it will be seen that if this system is adopted, no great outlay of capital is required in order to make a beginning, and any householder in town has room to keep at least 80 hens with a very little daily attention, and the returns would more than pay his rent.

The shedding system really means confining the birds in small pens, about 10 x 6 feet, roofed with timber or bark in preference to iron; such a pen will accommodate about 10 hens. This confining of the birds all the year round may not appeal at once to the uninitiated, who naturally think that the birds suffer from want of exercise, but such is not the case. The best kind of pen to erect would be a skillion shed, 6 feet high at the front, facing the east, and covered with wire-netting to allow the morning sun to penetrate the entire shed. The drinking vessel should be raised at least 1 foot from the floor, and the feed trough and grit tins fixed. The perches should be 1 foot 6 inches from the ground. The floor of the pen should be covered to a depth of 6 or 8 inches with fresh stable manure. One such covering will suffice for at least six months, provided an occasional wheel-barrowful is added to make up for the quantity used by the birds. The grain, which is distributed at night whilst the hens are on the roost, should be well forked into the manure. At daybreak the hens will be hard at it, scratching for their morning meal, and thereby following their natural instinct. In this way they get food as soon as they leave the perches, and also the benefit of the early morning exercise which securing it entails. The usual mash may be fed in the morning by being placed in the trough provided. The searching for grain will proceed most of the day, and will keep the birds busy, preventing them from falling into illhealth through lack of exercise.

After six months the manure should be replaced by fresh material, and the old stuff, which is now a most valuable fertiliser, may be used for the garden or orchard. Despite the fact that the manure is only changed twice yearly, it does not become soured, or otherwise objectionable to the birds.

There are many advantages to be derived from this system of keeping poultry; briefly, they are as follow:—protection from hot and cold winds, extermination of lice and mites (the ammonia acting as a splendid vermin killer), prevention of walking on a cold, damp, or frosty ground, and, instead, a footing of fresh stable manure, which is warm in winter and cool in summer. It also prevents laying astray, has proved itself a saving of labour, capital and food, and is the means of providing a valuable fertiliser. The droppings of each bird are estimated to be worth 1s. per annum.

The system has long since passed the experimental stage, as the most extensive farms in America are run on these lines. In Australia, also, poultry farmers are now adopting it with marked success, as, for convenience, economy and profitable results, it is unsurpassed. Should "shedding" be adopted in this locality, it is necessary that attention be directed to a suitable hatcher or brooder. The model [*produced*] would, I think, be the most suitable, as there is no danger of the brood hens being disturbed, and therefore the risk of broken eggs is comparatively small. The advantages of this brooder are many; probably the most important feature is that the hens will get off when hungry, and not being able to stray will return to duty themselves. Many eggs are broken by the hens through their being disturbed and unsettled, but by this arrangement there is no need to meddle with the hens at all. You can mark the date of each setting on the lid, so that you know exactly when each particular brood are to hatch. The estimated cost of a brooder to accommodate six sitters, well constructed, is 20s., and with care it will last for a lifetime.

As soon as the brood hen has hatched a clutch, swab her lightly under the wings with kerosene; this is not at all objectionable to the chicks and keeps them free from vermin. Hatch early in season so as to get winter layers. Avoid inbreeding, and never keep hens longer than two seasons for laying purposes. Do not keep any roosters with your laying hens, for you will then get more eggs and they will keep better. Always have the house on well-drained ground or on an elevated position. All eggs for setting should be well shaped, smooth and thick in the shell. Set them as fresh as possible—the fresher the egg the stronger the chick. For breeding purposes have at least eight and not more than ten hens to each cock. Select active birds for breeders. The cock should not be less than 18 months old, and the hens in their second period of laying.

There is one vital point in conducting an egg farm that I think should be mentioned, *i.e.*, the early disposal of all cockerels. Separate them as soon as you can distinguish them and sell at the first opportunity. The absence of all male birds on an egg farm is the foundation of success. With regard to breeding hens, it is perhaps necessary to point out a few proved facts. The cockerel (one to each pen of ten hens) should be penned up away from the hens for at least one month before the breeding season starts (which here would be about July), and got into proper condition. After he has been in the pen with the hens for a week he should be closely watched, and if favouritism is detected the pens should be regulated by changing the hens. If close attention to this matter is given there will be little fear of infertile eggs. Under ordinary conditions the percentage of fertility of eggs ranges about 63, but under this improved mating system it has ranged as high as 97 per cent.

To be successful with poultry, system and careful observation are as necessary to success as in any other business. The first essential step is the selection of the best stud stock it is possible to obtain, and the second, the proper mating of these birds. This is too lengthy a subject to deal with at present; suffice it if I say, in conclusion, that anyone who intends to keep poultry for profit must first decide upon the system that he will adopt, and then follow it to the letter.

The settlement of the Pilliga Scrub was discussed by Mr. Cameron as follows:—

How Best to Settle the Pilliga Scrub Lands.

During the last six years I have been farming and grazing in the Pilliga Scrub, and I have also been over a good deal of the Scrub, and have seen for myself the different kinds of country and soil. I divide the scrub into three divisions—Southern, Northern and Western, and I also divide the soil into three classes—second, third, and fourth. I do not class any of the soil as being first-class, although I have no doubt that some small portions could be found that could be called first-class.

In the first place, in that portion of the Scrub between Coonabarabran and Baradine and Dandry Creek and Rocky Glen, called the southern portion, of which I can speak with greater experience, we find a good many kinds of soil, and also many kinds of

timber. In most of this country the timber is very thick and dense, and the settler will have to do a good deal of hard work before he is able to put much of his land under cultivation. In this portion I would not be in favour of allowing a settler to take up more than 1,000 acres, as it has already been proved that this land will grow nearly all kinds of crops. From my own experience this land will grow, when cleared, splendid crops of wheat, lucerne and corn; and as for fruit, I do not think that any other part of the State is to be compared with it. What makes this portion so valuable for closer settlement is the good average rainfall, 29 inches, which renders the crops and fruits almost sure; there is very seldom, if ever, a failure.

In cutting up this land, I would advocate having the land settled in groups of, say, twenty farms, as near together as possible, so that the settlers could have roads and schools handy. I would also advocate leaving large areas of the fourth-class country as reserves for the settlers to run their cattle during dry spells, as my experience shows that this class of country is very good during dry weather (much more so than in wet weather), and if the settler later on desires to increase his holding, allow him to take up a further portion until eventually the whole is settled. It is necessary for the Government to give the settlers every encouragement, and to bring their holdings as near a market as possible by pushing railways and roads through the Scrub. A settler taking up this class of country has a good deal to contend with, such as clearing the ground to make it ready for cultivation. The timber has first to be ringbarked and then grubbed out. Burning off cannot be carried out in this class of timber, so that the settler must be prepared to work for two or three years before expecting to get any returns.

In the northern portion, towards Narrabri and Wee Waa, after passing Baradine, we find the character of the country changes, and the rainfall gets much lighter somewhere about 26 inches. The soil has a much better colour, being of a red sandy loam, very suitable for wheat growing, and also for fruit. I would not be inclined to give settlers more than 1,000 acres of this country. Here again, there is a great deal of timber to be cleared before the land is ready for cultivation. I would again advocate having large reserves of the fourth-class land in this portion held as reserves as a stand-by for the settlers; and also the grouping of settlers should be such that they can have the advantages of good roads and schools, and, if the groups were large enough, light lines of railway to feed the main lines, so as to allow the settlers to get their produce to market. When a settler takes up this class of country, there is bound to be a good deal of valuable timber that he could put to better use than ringbarking and destroying, but this he can only do if he can get a market for the hardwood timber, and that market can only come with the railway. The returns from the sale of the timber would greatly help the settler over the first two or three years. This class of land is not very suitable for sheep until such time as the timber is cleared, and the land ploughed and cultivated, and crops such as lucerne, rape and barley have been sown. Then I have no doubt he could rear a few hundred cross-bred lambs, which would greatly help to give a good return for his labour, and also help to manure the cultivation paddocks.

The western portion is that portion of the Scrub which lies between Coonamble and Baradine, where there is a much lighter rainfall—about 24 inches. In this part of the Scrub I would be inclined to give a settler about 1,500 to 2,000 acres. The country is much more suitable in its natural state for sheep than the other portions of the Scrub, the natural grasses not being so seedy or sour. Wheat can also be successfully grown in this portion of the Scrub.

My own general opinion of how best to settle the Scrub, is that the Government should first have all the good timbers cut and made into railway sleepers, and other kinds of marketable timbers, for, as everyone knows, timber is getting scarce. If the Government allows settlers to take up the land it must also allow them to ringbark the country, and destroy the good timber as well as the bad; and it seems almost a pity that this class of good timber should be destroyed wholesale, as must be done if settlers are going to make the best use of the land.

Some useful hints were given by Mr. D. Hagan, in the following paper:—

System of Haymaking.

As the time is again upon us for haymaking, it is advisable for all farmers to adopt the most profitable system. In order to get the greatest results for his labour, the farmer must consider the best method for making and handling his hay before he starts to cut his crop.

If it is intended to stack the hay after it is made, the crop should be carefully watched, and when it gets to that stage when the bloom is falling, and the grain is commencing to form, it should be cut without delay, and tied in small sheaves. Should the crop be heavy, it is not advisable to cut too close to the ground, as the extra gain in quantity

does not make up for the loss in quality. The sheaves should be stooked as soon as cut, and in order to do this two men are needed to follow the reaper and binder. Tie the sheaves about one-third of the length of the straw from the bottom. In stooking, place four sheaves together with their butts about 6 inches apart, press the heads together and take the fifth sheaf, turn its head downwards and draw it tightly over the heads of the other four; this gives a weatherproof stook and good sweet hay. As soon as cut, it starts to become hay, and if not stooked immediately it commences to sweat and the result is sour hay. Hay should not be stacked until it is thoroughly made.

Now, for hay that is to be put on the market straightaway. Leave your crop until the grain is well formed, full, but still soft; the sheaves may be made larger but stooked in the same way, and allowed to make. It will be found by this method that the yield will be from 20 to 25 per cent. more than by the first method, although the quality will not be quite so good. The reason for cutting earlier when hay is to be stacked is that, owing to the absence of grain, mice will not go into the stack, whereas if left till the grain stage, mice will not only eat the grain but pollute the hay and give it a very unpleasant smell, and once the hay has lost its own sweet, natural aroma the consumer does not want it

Fernbrook (Dorrigo).

Mr. G. Marks, Inspector of Agriculture, delivered a lecture to members of this branch on the 27th October. Much interest was taken in the lecture, and at the conclusion the lecturer was accorded a vote of thanks.

The Laying Down, Maintenance, and Improvement of Permanent Pastures.

In the introduction, reference was made to the great importance of the subject, particularly in the Dorrigo district, where no natural pastures exist, and where dairying is destined to form one of its principal industries.

After firing the scrub during the summer months, the selector has to proceed with the sowing of his grass seed. The question arises,—What grasses should be planted, and in what quantities? Though there were many who relied upon a one-grass pasture, it was a great mistake to adhere to this. Dorrigo has an elevation of from 2,000 to 3,000 feet. The soil for the most part is rich volcanic, and the rainfall ranges about 60 inches per annum. These climatic conditions were particularly favourable for the growth of all cool-climate grasses and clovers, in addition to paspalum, couch, and Rhodes grass which thrive so well in hotter climates. Such being the case, an endeavour should be made to plant as complete a mixture as possible, which will go a long way to maintain good feed for the greater portion of the year. Paspalum, couch, and Rhodes grass should be planted from October to January. The English grasses and clovers, such as cocksfoot, rye, prairie, fescue, crested dogstail, &c., should be planted in the autumn after the rains have set in, which ensures speedy germination. Special care should be taken to plant only clean seed. Many bad weeds on the Dorrigo have been innocently introduced through purchasing cheap seed. On the loose soil between the stumps and logs there is no need to cover the seed, as the first heavy shower will do that. The lecturer dwelt at some length on the general management of young pastures, the chief points being to carefully avoid heavy stocking, to prevent too rapid seeding, and to encourage the formation of a mat by light grazing till the grass is established. Keep a vigilant eye for noxious weeds such as dyeberry or inkweed, thistles, burrs, &c., and pull any out by the roots before they seed or spread. Subdivide and spell pastures in turn. Where grass has failed to germinate, go over and sow a little more seed. Any blanks are sure to encourage the growth of weeds and undesirable rubbish. Economy in the purchase of seed can be effected by spelling clean areas in turn, and allowing the grass to seed. The quantity shed naturally will also help any thin patches. It takes a couple of years to get a really good sole. Many inexperienced settlers have made the mistake of stocking up heavily as soon as a good show of grass appeared. This practice is disastrous to a young pasture; the heart of the grass is eaten out, while half, or even more, may be actually pulled out by the roots.

Summarising the principal points, Mr. Marks stated that selectors should not fell and fire more scrub than they are able to clean up and plant; plant clean and reliable seed (a mixture of 20 or 30 lb. of good clean seed evenly planted is ample); always include a couple of pounds of clover per acre in the mixture; keep stock off till well established; graze lightly for the first few months; subdivide well and spell paddocks in turn; keep down all weeds, and if they cannot be cut or pulled out by the roots at once, prevent seeding by brushing; resow all thin patches and encourage stooling, so as to get the land well covered. When once a good pasture is secured, it should be maintained by avoiding overstocking, spelling paddocks in turn, resowing seed from time to time, and

by cultivating a portion of land and growing green fodders to help the pastures when they are bare, which is usually during the late winter and early spring months.

At the meeting on 12th November, papers on "Potato Growing" were read by Messrs. A. Menzies and J. Kirkland. Both papers were well discussed.

Mr. MENZIES considered that Dorrigo could produce as good a potato as any other part of this State, provided the season was favourable and the proper variety of seed was used. Early potatoes, he said, did best when sown in September or October, as they ripened before the blight got too bad. Having tried many varieties, he had come to the conclusion that Eldorado and Queen of the Valley were the best to grow, as they were the only true blight-resisting potatoes, and he now grew no others.

Mr. KIRKLAND advocated the selection of good rich soil, good seed, and thorough cultivation of the land. The land should be well ploughed from 4 to 5 inches deep, and drilled 2½ feet apart and 4 to 5 inches deep. The potatoes should be selected from medium size, but he preferred those large enough to cut into two sets. The potatoes should be cut lengthways. They should be covered deeply and the soil well cultivated, in order to keep down the weeds. He recommended hilling when the plants were 6 or 9 inches high, and before they flowered, as the potatoes began to form about that time. He preferred Brownell's Beauty, as they are a good cooking potato, and stand handling well. White-skinned potatoes show the bruises. To get the best early potatoes, sow early in August, and for the main crop sow in October at the rate of from 8 to 10 cwt. per acre. The potatoes should not be dug until well matured, otherwise they would not keep well.

Forest Creek.

Mr. H. S. Major, Assistant Sheep and Wool Expert, visited the Forest Creek district on 14th October and subsequent days.

PREPARATION OF FARMERS WOOL FOR MARKET.

The intention of the visit was to give instruction in preparing farmers' wool for market. Only two members' sheds were working, and a welcome fall of 80 points of rain delayed operations at these two sheds, and at others about to make a start; but the demonstrations given seemed to interest members, and some indications of methods of classing were also given where shearing had not yet commenced.

It was explained that small clips do not lend themselves to "classing" in the strict sense of the term, but a farmer may be quite able to correctly "prepare" his clip of thirty bales, though lacking the knowledge necessary to correctly "class" a clip of 300 bales. A clip from 1,000 grown sheep demands at least the proper skirting of the fleeces, the dividing of the fleece portion into two classes, and the separate packing of the skirtings, bellies, locks, and stains. The Forest Creek Merinos would cut approximately twenty-five bales to 1,000 grown sheep, and such a clip might advantageously be classified as follows:—

Skirted Fleece Portion—15 Bales.	9 bales—AA Comb—Long and light in condition.
	6 bales—A Comb—Short and heavy in condition.
Pieces—10 Bales ...	4 bales—AA pieces (best of skirts)
	2 bales—A pieces (trimmings of skirts).
	2 bales—bellies.
	1½ bales—locks.
	½ bale—stained.

In making a mixed bale of two different lots of wool of approximately the same value, do not intermix the wool, but separate the different lots in a bale by a double sheet of newspaper.

About 85 per cent. of the fleeces of any Merino clip constitute the average quality of the wool of that clip; the remaining 15 per cent. may be extra fine or extra strong, so that the farmer need not bother about quality when making the little preparation necessary. Length and condition, are with him, the main factors in preparing his Merino wool for market. If a farmer merely selects fleeces for length of staple, he will find that unconsciously he has in most cases also selected for condition, so close is the relation between these two characteristics. In other words, nearly all the heavy greasy fleeces are short in staple, while the comparatively light-conditioned, high-yielding fleeces are long.

In classing cross-bred fleeces quality and length are the chief characteristics to keep in view. Here, again, there is a very close relation, as the longest cross-bred wools should be (and are, if the breeding be correct) the coarsest wools. On the contrary, the shortest stapled fleeces will be found the finest in quality. In a cross-bred clip cut from, say,

1,000 first-cross sheep, two distinctions for quality should be made in the fleece portion. Brand the finer quality "1st x-Bred A," and the coarser quality "1st x-Bred B." It would be incorrect to brand two such lines of wool "A x-Bred" and "B x-Bred" respectively.

Make no distinctions for quality in the pieces of a small clip.

If you have 900 first-cross ewes and 100 very coarse three-quarterbreds, draft the latter off, shear them before or after the main flock, and keep all the wool separate from the first-cross wool. Many farmers' clips are spoiled by being sent to market in this way. Sooner than subdivide an uneven line of 12 bales of fleece into two fairly distinct lots, both are included in the one lot, and we find short, fatty fleeces yielding about 46 per cent. mixed with long, bright fleeces yielding 56 per cent. The difference is almost wholly due to the greater yolk secretion in the former wool, and if all other things are equal this difference in yield alone will make a difference of 1d. per lb. greasy.

Some farmers are under the impression that fleeces free from burr do not need skirting. That is a mistake. The shoulder yolk fringes should be skirted off; and, continuing round the neck end, the short, matted (and nearly always seedy) cheek and head portions should be taken off. The breech wool (hind legs) is always inferior in quality to the rest of the fleece, and the tips are broad and wasty through contact with the ground. Most of the breech, and always the stained wool, should be taken from the fleece before it is rolled up.

A wool shed is not a wool-sorting establishment, and shed hands are not wool-sorters. Their work of wool-rolling and piece-picking is not highly skilled, and they are never called upon to discriminate further than the difference between long and short, burry and free, clean and stained wool. On the other hand the whole basis of wool-sorting is quality. In every shed something preparatory should be done with all wool before it passes to the wool sorter. Fleeces direct from the sheep are more easily handled than when they have been compressed for months in packs. Even the lowest grades of wool, viz., locks, are capable of much improvement on the sorting tables; and if it pays buyers to employ skilled sorters who often take a whole day to sort a 4-cwt. bale of locks, surely it must pay to put some work, even though not necessarily highly skilled, into the fleece portion and better piece classes of a farmer's clip before it leaves his wool shed.

Those farmers who had not begun shearing at Forest Creek brought their flocks to the yards for classification. Every ewe was handled and reasons given for her selection or rejection from a breeding point of view. Three neighbouring members of the Bureau last year co-operated in the construction of a sheep dip, and they lend each other assistance in the operations. It only costs these men ½d. per sheep, and they are more than convinced of the overwhelming advantages of dipping.

Garra and Pinecliff.

The Garra and Pinecliff Branch has been established, with a membership of twenty-eight. The following gentlemen have been elected office-bearers:—Chairman, Mr. S. Packham; Vice-Chairman, Mr. W. Rockliff; Hon. Treasurer, Mr. A. G. Sear; and Hon. Secretary, Mr. A. S. Blackwood.

Hillston.

At the first meeting of the Hillston Branch, held in October, Mr R. C. McKenzie read a paper, as follows:—

Rabbit Destruction.

There are many methods used for destroying rabbits. The following are a few of the most successful:—

(1) Poisoning with phosphorised pollard. This method of destroying rabbits has been carried on with more or less success for a number of years. My experience with it has been that when there is no green feed the rabbits will take it readily, and good work can be done in a very short time; but when there is plenty of green feed it is mostly a failure. But poisoning with phosphorised pollard has its disadvantages. I believe it has been the means of destroying many valuable birds; for instance, the wild turkey, which used to be so much sought after by sportsmen, has been practically wiped out of existence. Then there is the plover, a bird that helps to keep down other pests, such as caterpillars, grasshoppers, &c. Where one time hundreds of these valuable birds could be seen running about the plains, now it is a rare thing to see one. I believe also that

many of the enemies to the rabbit, such as iguanas, wild cats, foxes, &c., are destroyed through eating the carcases of the poisoned rabbits.

(2) Poisoning with water, in my opinion, is the best and safest method of all, if the rabbits are picked up every morning and burned; but if it is not done the danger again arises of destroying the common enemy to bunny. I have also known cattle to die through eating the dried carcases of rabbits that have been poisoned with arsenic or strychnine, and if the rabbits are left to lie they are only a breeding ground for the blowfly pest. This mode of dealing with the rabbit can only be carried out when there is not a vestige of green feed, and water is very scarce, which is only on very rare occasions, and then it must be very hot weather, as I have known rabbits to live and do well when there was neither water nor green feed, in cool weather.

(3) Ploughing in the burrows. This method no doubt is an excellent one. It is carried on extensively on plain country, and is a great success; but in thickly timbered country it is not practicable.

(4) Digging out the burrows. This is the only method by which the burrows in timber country can be destroyed; but this is also too expensive where the burrows are very plentiful. A cheaper way, which is fairly successful, is to stuff paper into the mouth of the burrow and then fill it in Sometimes the rabbits will die rather than pass the paper, and at other times they will dig their way out when hunger chases the fear of the paper ghost from their minds. I have known them to get out after being closed in for eight days. Another way to make this plan more successful is, before filling in, to throw poisoned pollard into the burrow in large or small quantities, according to the number of rabbits supposed to be in the burrow; but it is only a partial success if the burrows are not utterly destroyed, as they always open them again in time.

(5) Fumigating the burrows. I have had no practical experience with this mode of destruction, but I have heard different opinions from those who have tried it. Some say that it is a failure, and others that it works well in small burrows, but many of the rabbits in large warrens escape, as the fumes will not penetrate to the bottom of the deep holes.

(6) Trapping with spring traps. This plan is too slow for this district, but works well in closer settled districts where they can be got to market soon after being caught.

There are other methods of destruction, such as trapping into wire-netting yards around tanks when water is scarce, and sinking pit traps along the wire-netting fences. Although all these methods have been carried on vigorously for the last twenty or more years, and man is puzzling his brains to invent some quicker and more successful method to wipe out the pest, bunny still lives and defies extermination.

Mr. PETERS said that the method of poisoning by water was only useful in hot dry weather. He considered the best time for laying poison was after showers at the end of autumn. His experience also was that if poison were continuously laid, the rabbits after a time would not take it at all. He considered it would be a good plan for all tanks and waterholes in the district to be wire-netted for a month during the summer. This would entail hand watering of stock, but he thought it would result in the destruction of an immense number of rabbits.

Mr. KNECHTLI remarked that in some districts the P.P. Board fixed a time for simultaneous poisoning on all holdings in the district.

Mr. RANKEN said simultaneous poisoning was not always a success, as rabbits might take the poison at one place, and a few miles away not touch it. He considered the best way was to continue laying small quantities till it was found the rabbits were taking it freely, and then get out the poison carts and poison thoroughly. Good results followed fumigating. In sandy ground it was best to do this after rain, when the pores of the earth are closed. The carbon should not be fired, but the mouths of the burrows should be filled up and well stamped. Absolutely the best method on small holdings was to wire-net the holdings and dig out the burrows. Stuffing paper in the burrows and filling in was good, and an excellent method was ploughing in the warrens. This should be done when the ground was dry.

Mr. T. McKENZIE said he had tried all methods, but found the only method by which he could effectually stamp out the pest was by netting his holding and digging out the burrows. The systems of trapping at tanks and pit traps along fences were also recommended.

Mr. J. HUTCHINSON said he had found stuffing the burrows with paper, and putting poison into the burrows before doing so, an excellent method. He considered ploughing in the warrens, when the ground was dry, and afterwards poisoning and hunting with dogs those that escaped, absolutely the best method. Great success also followed filling in the burrows.

A vote of thanks was passed to Mr. McKenzie for his interesting paper.

The second meeting of this branch was held on 22nd November, when Mr. John Hutchinson read a paper giving his own experience of haymaking and stacking.

HAYMAKING AND STACKING.

Before a start was made, he said, the reaper and binder should be thoroughly overhauled and cleaned, kerosene run through all the bearings to clean them, and worn-out parts replaced. The crop to be cut for hay should not be left too ripe, nor yet cut too green, the exact stage depending largely on whether it was intended for home use or for market. For his own use he preferred to leave it until it was fairly ripe, and there was a fair amount of grain. If a good colour was required and grain was to be added, it was better to cut green. After cutting, it was advisable to leave it for a few days before stooking to allow it to dry, if the weather was fine. The quickest and easiest way of stooking the sheaves was with a fork. The size of the stooks depended on the length of time the hay was to be left in the paddock before it was stacked. If it was to be left for long it was advisable to put it in large stooks; if carted in soon after cutting small stooks were preferable, as entailing less labour. The straw should be dry and the grain hard before hay was stacked, otherwise there was a danger of the hay becoming mouldy in the stack. He found the quickest method, if the hay had to be carted a distance of three-quarters of a mile to a mile, was to use a big waggon and large frame with six horses, with two men on the ground pitching and one on the waggon. In this way he could cart four loads per day of about 3 tons each. He recommended as a foundation for the stack a layer of green box leaves, which kept the hay from becoming damp and mouldy at the bottom of the stack. In starting to build the stack he built from the outside, and built towards the centre, which he kept full and higher than the outside so as to throw the rain. He worked round the opposite way each layer of sheaves and was careful to put good sound sheaves in the corners and keep them well filled up, as these were most liable to slip. He prefered to build with a fork rather than with hand. The last row of sheaves before starting the roof he put out about 6 inches beyond the walls, then each successive outside row was brought back nearly to the bands of the row of sheaves just below

The CHAIRMAN thanked Mr. HUTCHINSON for his paper, and invited discussion.

The opinion was expressed that one man loading on the waggon could not keep two men on the ground pitching.

Mr. W. CASHMERE thought a dray was preferable to a waggon if the hay had only to be carted a short distance. A dray would take from 300 to 350 sheaves in a load.

Mr. A. CASHMERE said about 4,500 sheaves could be carted in one day by waggon with the stack a mile away.

With regard to the size of stooks when the hay was left in the paddock for some time, Mr. A. CASHMERE thought at least 100 sheaves were required to make a stook waterproof. He had put as many as 180 in one stook.

Mr. ROBERT MCKENZIE advocated the building of large stooks, as the hay often had to be left in the paddock until after the harvest was completed.

Mr. W. CASHMERE asked how many sheaves were required to build a stack measuring 35 by 20 yards, built to the usual height.

Mr. A. CASHMERE said he had an unfinished stack 30 yards by 18 yards and 17 feet high, in which he had put 12,000 sheaves. This stack was much higher than was usual.

At the next meeting Mr. A. Cashmere will contribute a paper on the best wheats for hay in Hillston district.

Katoomba.

A demonstration in handling bees was given to the members of the Blue Mountains Branch on 29th November.

The first hive opened contained a large quantity of drone comb, and it was pointed out how this comb tended to render the colony unprofitable. Full sheets of medium brood comb foundation were recommended as the best means of securing a strong, profitable worker comb for the brood nest, and it was shown how the close spacing of the brood combs would tend to send the bees into the supers more quickly than the wide spacing.

Several questions were asked, and while hives were opened good opportunities were afforded for practically illustrating the reply to each. A modified Bolton hive was brought to the apiary, and after comparing it with the two-storey deep-bodied Langstroth hives in use in the apiary, it was plainly seen that the Bolton hive made for lighter and quicker work

Kenthurst.

A new branch has been formed at Kenthurst with twenty-three members. Office-bearers have been elected as follows:—Chairman, Mr. A. Roughley; Vice-Chairmen, Messrs. J. J. Parr and A. McGuffin; Hon. Treasurer, Mr. W. Edmunds; and Hon. Secretary, Mr. J. R. Jones.

At the meeting held on 3rd December, Mr. A. E. Read read a paper on the following subject:—

The Cultivation of the Orchard.

A great many seem to think that the only reason for cultivating, apart from destroying weeds, is to conserve moisture, and I have noticed very often in going through the district that a great many get the harrow or cultivator out after a shower of rain and run over the place, and that is the last it sees of it till the next shower.

Cultivation not only conserves moisture, but aerates the soil and lets the oxygen from the air into the ground without which the bacteria which are constantly at work preparing the plant-food for the plant's use could not thrive.

Against frequent cultivation, except after rain, I have heard the objection that the fine dust-mulch which results is, on our soils, inclined to set very hard quickly when rain does come.

If care is taken to work up as soon as possible after rain, this objection should not be a serious one, and is quite outweighed by the advantages, for tests made in other parts of the world show that a far greater percentage of moisture is retained in soils which are worked to a dust-mulch than in others.

With regard to the implements used, I am of the opinion that if it were possible to fork-hoe all over, the trees would live longer and do better, but this is out of the question, owing chiefly to labour conditions. There are many who think that a good ploughing each year is necessary, but there are orchards in the district which never see a plough, and still continue to do well. The plough should be used with very great care in ground like ours, and among surface-rooted trees like all citrus fruits.

All students of soil chemistry are agreed that the most important item in a fertile soil is humus—decaying vegetable matter—and our soils are very short of this necessary adjunct to fertility. We would be greatly benefited if we could add more humus to our ground; and the part of my orchard in which field-peas were planted last autumn, and ploughed under in the early spring, is at present in a better condition than the part which had ordinary cultivation.

The trouble is in the turning in. It is necessary to put the plough down a few inches to cover any quantity of green stuff, and I had a bad time when I started to turn mine under, for it was impossible to plough as deep as was needed to cover the peas; but I have been well repaid for the trouble, and intend planting again next year.

One of the results of cultivation is the forming, in our ground, of a hard bottom. This seems impossible to prevent, and if it cannot be prevented, we must look round for a cure. I think we are going to find this in the judicious use of explosives; and, although they are only in their experimental stage in this country, a great future can be predicted for them.

Leech's Gully.

The usual monthly meeting of this branch was held on 11th November, when eleven new members were enrolled.

Mr. W. J. East, Manager of the Tenterfield Butter Factory, read the following paper:—

Dairying.

In glancing through the records of the local factory for the past eight years, I find that dairying in this district has practically made little or no progress during that time. One reason for this is that a large percentage of farmers turn their attention to dairying one year, and the next they sell their cattle and go in for agriculture, or sheep. In two or three years we find these men returning to dairying, and starting off the same mark as they did at first. Such men never get beyond the first round of the ladder to success. Whether a farmer goes in for dairying, or combines dairying with fattening sheep, or with agriculture, he should have some fixed policy.

Whatever number of cows you propose getting for dairying, aim at getting the best. A poor cow will take up the same amount of time and eat as much grass as a good one. It may not be possible to start with a choice lot, but get the best you can, and after

deciding what breed you wish to work up to, get a purebred bull, and in a few years you should have a profitable herd of cows

Every dairyman should have his cows tested, and cull out all wasters. Great care should be exhibited in the cleaning of vessels and also of separators. Separators should be regulated so as to produce a cream of 38·7 to 42·7 in summer, and from 35·7 to 38 in the winter. If this is observed the best results will be obtained. Once cream is separated, it should be cooled and aerated so as to remove animal heat and gases as early as possible, and it should be kept cool until delivered at the factory. A good plan is to wrap a wet bag round the can. It is a mistake to separate cream into a can containing a previous separating Dairies should be well ventilated, and in such a position that prevailing winds will not blow dust from the yard towards the dairy.

Competition grows keener each year, therefore dairymen should aim at placing the industry on the highest level by supplying a cream of the highest grade. Cream should be delivered three times a week in the summer, and twice in winter. It should be delivered as early as possible in the morning, and not exposed to the sun, but covered. The earlier it is delivered and cooled down to churning temperature the better for the quality.

Some discussion ensued, during which Mr D. WEIR asked if it would be a very difficult matter to learn how to test milk. Mr. EAST said that it depended upon the aptitude of the learner. Several suppliers to the factory had purchased testers, and had learned in one lesson.

It was decided to purchase a Babcock four-bottle tester for the branch.

Moruya

Mr. H C. Coggins, of the Department of Agriculture, gave an instructive demonstration and lecture on the use of explosives in agriculture in Mr. Simpson's paddock on 25th November.

The demonstrations were in clearing and subsoiling, and great interest was exhibited in the proceedings.

Mr. Coggins easily proved the value of gelignite as applied to clearing, a fairly large stump being completely blown out at a very small cost.

The subsoiling demonstration was of special interest to farmers in this centre. Mr. Coggins fully explained the method and its great advantages.

New Italy.

Much interest was displayed by farmers at this centre in connection with the visit of Mr. H. C. Coggins, Assistant Inspector, for the purpose of giving a demonstration in the use of explosives in agriculture on the 1st November. Owing to a heavy fall of rain the subsoiling and log-splitting demonstration had to be abandoned, but two large stumps were successfully shattered. It is hoped that Mr. Coggins will be able to visit the district early next year to give further information on the subject.

Redbank.

At the meeting of this branch, held on 14th November, Mr. Cullen read an interesting paper.

PEA GROWING.

In Mr. CULLEN's opinion the district was suitable for growing this crop, which could be raised in rotation with potatoes. The soil should be well ploughed, and harrowed a couple of times. His experience was that from 1 to 1½ bushels per acre was sufficient to sow, the drills being kept 3 feet apart. About 100 lb. of No. 3 Fertiliser per acre had proved profitable. The crop should be sown at different dates, so as to secure a succession of pickings. He found peas yielded from 80 to 120 bushels per acre. Prices certainly fluctuated, but the crop was always a payable one to grow. Yorkshire Hero was the most profitable kind. Farmers could consider the advisability of ploughing the growth in as green manure after picking the first crop.

Wollun.

Mr. H. S. Major, Assistant Sheep and Wool Expert, spent five days in this district early in November, visiting different sheds for the purpose of giving advice and practical demonstrations on the preparation of wool for market. As most of the sheds had just begun operations the time was very opportune for such work.

The district is noted for superfine Merino wool, which brings the highest prices in New South Wales. The New England wools, in fact, are the equal of western Victorian for fineness of fibre and softness, though the western Victorian wools are longer in staple and even a better colour.

There is no burr, and very little bad seed; the fleeces are therefore "free," and require very little, though careful, skirting. The bulk of each clip would be made up of skirted fleece wool—about 63 per cent. From 1,000 grown sheep two classes of fleece should be made. The "free" pieces, bellies and locks always bring high prices, and the average price per lb. of whole clips is high, but in many cases the return per head is not what it should be in these days of better knowledge of breeding.

The use of the four steel skewers in holding down the cap when the "monkey" is released, and while the flaps are stiched, previous to the withdrawing of the skewers, was new to some of the members. The method was demonstrated, and the advantages as regards time saved and economy were very evident. Under the old method of packing, some growers were using at the rate of twelve hanks of twine per 100 bales. With the skewers 2½ hanks of twine will do all the necessary sewing for 100 bales.

Branding Bales.—Some growers were branding on the round, or wrong side. It is easier to truck a bale of wool on the square side (where the seam stitching is at the bottom) than on the round side; and in branding a bale on one square side it serves a convenience at the stores where the bales are placed on the show floors with the brands facing out.

Sheep-Classing.—Most of the smaller graziers began with very poor breeding ewes, and in the past have had little opportunity of practising selection, consequently in some small flocks many different types were found Growers were advised to cull and endeavour to breed out the little, light, short-woolled, black-tipped, wrinkly sheep, with the "frilled-lizard" heads which necessitate wigging about three times a year. All members were agreed on this point. Then again, there are too many heavy, black-tipped sheep, for which the climate is to a great extent responsible, but the fault is chiefly attributable to the long continued use of short-stapled, "hard" black-tipped rams. A nice light pearl tip is not objected to; but the black tips all over the fleeces of some of these extreme types can, in many cases, only be distinguished from the hard encrusted fluid brands under close inspection. Such sheep cut heavy fleeces no doubt, but there is too much waste in the scour, and a few of these fleeces scattered through a line of fleece wool often spoil a good sale. Another bad type noticed was the light-conditioned woolled sheep, carrying a very short staple, with a thin flattened tip which exposed a weakness all along the backbone.

New England is producing small sheep of the fine wool type, but it is evident that frame has been sacrificed for fine wool, and breeders have for too long been using rams too short in staple and "over-fine." That the introduction of bigger-framed, plain-bodied rams into such districts is of benefit has been proved in western Victoria, and a case may be instanced where 5,000 old ewes were mated with medium-woolled Riverina flock rams, and the lambs' wool sold up to 20¾d. per lb., greasy. For size these lambs beat any others in the vicinity, and the grown wool later on sold up to 17d. per lb., greasy. Mr. Blaxland, of Wollun, recently introduced flock rams of the type mentioned, from a well known stud near Urana. The first lot of hoggets so bred were shown during the visit under reference, and it was plain that the owner would profit by the departure.

Wolseley Park.

Mr. H. O. Oliver, M.R.C.V.S., visited Wolseley Park between the 14th and 16th November. During his stay in the district he gave two lectures, one at Wolseley Park on "Conformation and Unsoundness in Horses," and another at Mundaroo on "Strangles, Influenza, and Tetanus in Horses." In addition to the lectures, Mr. Oliver also gave two practical demonstrations, at which he explained the nature of hereditary diseases and unsoundness.

Orchard Notes.

W. J. ALLEN.

JANUARY.

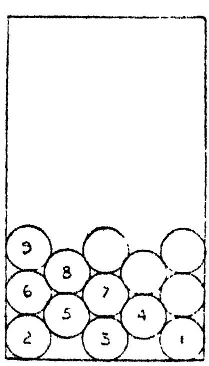
Cultivation.

EVERY effort should be made to keep the orchard soil well cultivated at this season of the year; January being usually a hot, dry month, evaporation of soil moisture is constantly going on. Keeping the ground well stirred forms a soil mulch which reduces the loss of moisture and keeps the soil in the best condition to receive any rain that might fall.

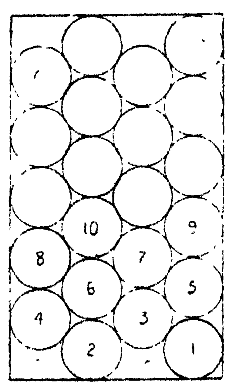
Marketing Fruit.

Harvesting and marketing fruit will occupy the greater portion of the time of summer fruit-growers at this season. It seems superfluous to impress upon growers the necessity for careful picking, grading, and packing. Good fruit, well put up, brings handsome prices on the Sydney market. On the other hand, faulty grading and packing can only result in poor prices and dissatisfaction.

In packing the fruit the numerical system should be adopted. This permits of the fruit being packed diagonally in the rows. Careful grading is essential. The packing under this system is known as the 2-1, 2-2, or 3-2-3 packs. The two latter are illustrated, while the 2-1 is similar to the 3-2-3, except that the two outside vertical rows are missing.



3-2-3 Pack.



2-2 Straight Pack.

Scale Insects on Citrus Trees.

Either fumigation or spraying with special resin wash is suitable for con trolling brown, red, or Indian wax scale. These pests rob the plant of its vitality, and should not be allowed on any account. Both fumigation

and spraying should be carried out in the cool part of the day or with the former preferably at night. Bulletins treating with both these operations can be had upon application.

Drying and Canning.

Peaches and apricots suitable for drying or canning will be ripening this month. For the former purpose, see that the fruit is thoroughly ripe before picking from the trees. Cut them evenly before placing them on the trays, cut-side up, then submit them to sulphur fumes for about two hours, after which they may be placed either in the sun or in the evaporator, as the case may be. Pamphlets dealing with fruit-drying, and canning and bottling can also be secured upon application.

Summer Pruning.

This work can be carried out at the present time. The inside of young pome fruits and also of Japanese and European plums requires a good deal of attention. Right along the scaffold limbs many growths are found which are not required for making limbs; these need to be shortened in to ensure that the framework of the tree is strong enough to support future crops. Thinning out also ripens the wood and matures the buds better for next year's crop. Yearling trees require little or no attention, and weak trees should not be touched.

Irrigation.

Wherever water is available to irrigate fruit-trees or vines, it is more than likely that they will require a thorough soaking this month. See that the water is confined to furrows, and be careful not to allow it to flood over any portion of the land; also, that the best use is made of such water, and that none of it is allowed to run to waste.

After the soil has been well soaked, and as soon as the land is sufficiently dry to work, give it two deep cultivations in order to bring it to a proper state of tilth. Also see that all vines and trees are well worked around with a fork-hoe while the soil is still damp. This will keep the ground from baking, and prevent excessive evaporation.

Re-working Old Trees.

During the next few weeks, the budding over of worthless summer fruit trees can take place. Such working at this season is known as dormant budding, because the buds do not burst until next spring. The buds used for the purpose should be selected from trees of known bearing habits. Insert them on the outer or under side of the limbs, where it will be found that the bark usually rises more easily than on the upper side, and where they are more apt to form a well-shaped tree than if the buds had been inserted on the upper or inner side of the limbs.

Green Manuring.

This important work should not be neglected. Many of our coastal citrus soils require building up in humus supply. For this purpose such crops as

field peas, vetches, rape, barley, and rye should be tried in places suitable to their growth. Grey field peas are a splendid cropper in the Cumberland orchards, making a big stand of greenstuff for ploughing under. The cost of seed, and the time taken in sowing, seem to be the chief reasons for so little attention being given to the important work of improving our soils.

Codlin Moth.

All infested fruit and windfalls should be attended to. No fruit infected with grubs should be allowed to remain in the orchard, as, given mild weather, a further infection will take place in the growing fruit. There is also the likelihood at this time of the year that the grubs will hibernate in the rough bark and crotches, and remain over the winter to infect the early crops next season. In some of the cooler districts it will not be amiss to make a final application of arsenate of lead to ensure the destruction of all grubs.

AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1914.

Society.	Secretary.	Date.
Albion Park A., H., and I. Association	M. A. Brown ...	Jan. 14, 15
Gosford and Brisbane Water A. and H. Association	R. J. Baker ...	„ 23, 24
Kiama A. Association	G. A. Somerville...	„ 23, 24, 26
Wollongong, A., H., and I. Association	W. J. Cochrane ...	„ 29, 30, 31
Berry Agricultural Association	S. G. Banfield ...	Feb. 4, 5
Dorrigo A., H., and I. Society	W. R. Colwell ...	„ 10, 11
Moruya A. and P. Society	H. P. Jeffery ...	„ 11, 12
Alstonville Agricultural Society	C. D. McIntyre ...	„ 11, 12
Shoalhaven A. and H. Association (Nowra)	H. Rauch... ...	„ 11, 12
Wyong A. Association	J. H. Kay ...	„ 12, 13, 14
Guyra P., A., and H. Society	P. N. Stevenson...	„ 17, 18, 19
Gunning P., H., and I. Society...	J. R. Turner ...	„ 18, 19
Newcastle A., H., and I. Association	E. J. Dann ...	„ 18, 19, 20, 21
Central Cumberland A. and H. Association	H. A. Best ...	„ 20, 21
Dapto A. and H. Society	J. H. Lindsay ..	„ 24, 25
Manning River A. and H. Association	S. Whitbread ...	„ 25, 26
Inverell P. and A. Association	J. McIlveen ...	„ 25, 26, 27
Bowraville A. Association	C. S. Cliff ...	„ 26, 27
Robertson A. and H. Society	R. R. Graham ...	„ 26, 27
Uralla A. Association	H. W. Vincent ...	Mar. 3, 4, 5
Tenterfield P., A., and M. Society	F. W. Hoskin ...	„ 3, 4, 5
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Bega A., P., and H. Society	W. A. Zingel ...	„ 4, 5
Port Macquarie & Hastings Dist. A. and H. Society...	T. Dick ...	„ 5, 6

AGRICULTURAL SOCIETIES' SHOWS—*continued.*

1914.

Society.	Secretary.	Date.
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Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn ...	Imperialist ...	Florio	Lady Nancy of Minembah.	Wollongbar Farm	*
Jersey ..	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Wagga Farm ...	*
,, ..	Thessalian II. ...	Thessalian (imp.).	Egyptian Princess (imp.).	,, ,,	*
,, ...	Royal Blood ...	Berry Melbourne	Calceolus ...	Wollongbar Farm	*
,, ...	Xmas Fox (imp.)	Silver Fox ...	Malvoisie ..	Berry Farm ...	*
,, ...	Kaid of Khartoum	Sir Jack ...	Egyptian Belle	Wagga Farm ...	*
,, ...	Bridegroom ...	Best Man ...	Golden Omelette.	Yanco Farm ..	
Guernsey ..	The King's Mirror	Calm Prince ...	Vivid (imp.)...	Kyogle	30 June, '14.
,, ...	Star Prince ...	Calm Prince ...	Vivid (imp.). .	,, ...	5 Mar., '14.
,, ...	Sky Pilot ...	Prince Souvia ...	Parson's Red Rose (imp.).	Maclean	11 July, '14.
,, ..	Prince Souvia ...	Vivid's Prince...	Souvenir (imp.)	Grafton ...	*
,, ...	Sequel's Lad (imp.).	Sequel's Monogram.	Moss Rose of the Barras.	Wollongbar Farm	*
,, ...	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (6509)	Inverell	5 April, '14
,, ...	Sunshine ...	King of the Roses	Princess Vivid	Grafton	15 Jan., '14.
,, ...	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	*
,, ...	Claudius (imp.)	Golden Star II..	Claudia's Pride (imp.).	Tweed River ...	18 Feb., '14
,, ...	Trengwainton Village Favourite (imp.)	Trengwainton Village Lad.	Wild Eyes ...	Berry Farm ...	*
,, ...	The Peacemaker	Calm Prince ...	Rose Petersen		31 Dec., '13.
,, ...	King of the Roses	Hayes' King ...	Rosey 8th (im.)	Bega	20 June, '14.
,, ...	Lauderlad ...	Laura's Boy ...	Souvenir of Wollongbar	Kyogle	3 Mar., '14.
,, ...	Royal Preel ...	Itchen Royal ...	Hayes' Lily du Preel (imp.).	Murwillumbah ...	9 May, '14.
,, ..	Prince of Warren Wood (imp.).	Kingsmoor Governor (1952)	Quail (7051)	Macleay River ..	8 Feb., '14.
,, ...	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Frederickton ...	20 Mar., '14.
,, ...	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	H.A. College, Richmond	*
Ayrshire ..	Jamie's Heir ...	Jamie of Oakbank	Miss Prim ...	Grafton Farm ...	*
,, ...	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose...	Grafton Farm ...	*
,, ...	Orphan Boy ..	Songster of Greystanes.	Rosamond ...	Glen Innes Farm..	*
,, ...	Wyllieland Bright Lad (imp.)	Wyllieland Gleniffer (7229)	Wyllieland Sangie	H.A. College, Richmond	*
Kerry... ..	Kildare II ...	Kildare (imp.)...	Belvedere Bratha 3rd (imp.).	,, ,,	*
... ...	Bratha's Boy ...	Aiom Chin (imp.)	Bratha 4th ...	,, ,,	*
,, ...	Rising Sun ...	Bratha's Boy ...	Dawn ..	Bathurst Farm ...	*

*Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed.

Department of Agriculture,
Sydney, 2nd January, 1914.

BULLS FOR SALE

AT BERRY EXPERIMENT FARM.

GUERNSEYS.—**Lassie's Favourite:** sire, Trengwainton Village Favourite (imp.); dam, Rohais Lassie 2nd; calved 14th June, 1912. Price, **£30.**
Rohais Lassie (imp.), dam of Rohais Lassie 2nd, gave 333 lb. butter in 42 weeks.

Four-leaf Shamrock: sire, Calm Prince; dam, Shamrock of Les Vesquesses (imp.); calved 26th November, 1912. Price, **£30.**
The dam of this bull gave 285 lb. butter in 41 weeks.

King of the Preel: sire, Trengwainton Village Favourite (imp.); dam, Flower of the Preel 3rd (imp.); calved 31st December, 1912. Price, **£30.**
The dam of this bull gave 332 lb. butter in 40 weeks.

AT COWRA EXPERIMENT FARM.

JERSEYS.—**Shakespeare:** sire, Sir Pat; dam, Leading Lady; calved 13th January, 1912; colour, whole fawn. Price, **20 guineas.**
Leading Lady is by Berry Melbourne from Lady Tidy 4th.
Lady Tidy 4th was by Golden Lord from Lady Tidy 3rd (imp.).
Berry Melbourne is by Melbourne (imp.) from Rum Omelette (imp.).
Sir Pat is by Sir Jack from Pattibello (192)
Leading Lady, on her first calf, yielded 3,346 lb. of milk, testing 6 per cent., equal to 237 lb. of butter.

Fresh Gold: calved 12th June, 1912; colour, whole; sire, Old Gold; dam, Lady Colleen 2nd (A.J.H.B.). Price, **£12 12s.**
Lady Colleen 2nd is by Golden Pride from Lady Colleen (488, A.J.H.B.).
Lady Colleen (488) is by Golden Lord (39, A.J.H.B.), from Billie (18, A.J.H.B.).

AT GLEN INNES EXPERIMENT FARM.

AYRSHIRES.—**The Poet:** calved 17th February, 1912. Sire, Byron; dam, Scotch Heather, by Jamie's Ayr; gd, Leaf Bud, by Prince Emerald (imp.); ggd, Rose Berry, by Mischief Maker of Barcheskie (imp.), 3,892. Price, **£10.**

Byron's Boy: calved 3rd March, 1912. Sire, Byron; dam, Hattie Craig, by Daniel of Auchenbrain (imp.); gd, Juliette, by Mischief Maker of Barcheskie (imp.), 3,892; ggd, Judy IX of Barcheskie (imp.), 11,882, by Traveller of Drumjoan, 1,441. Price, **£10.**

Bright Boy: calved 8th November, 1912. Sire, Wyllieland Bright Lad (imp.); dam, Moonstone, by Emerald's Mischief; gd, pure Ayrshire Cow, No. 163, Hawkesbury Agricultural College Register. Price, **£5 5s.**

GEORGE VALDER, Acting Under Secretary, and
Director of Agriculture.

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Agricultural Gazette of New South Wales.

Sheep and Wool for the Farmer.*

CROSS-BREEDING EXPERIMENTS FOR 1910-11-12-13.

THE WOOL AND MUTTON TYPE.

J. WRENFORD MATHEWS.

PREVIOUS reports have already given a fairly clear idea of the main lines upon which investigations are being pursued in this experimental work. Past references to the subject have also afforded considerable information regarding the nature and general physical character of the breeds employed, and have further indicated their uses for crossing purposes. In the March, 1912, issue of this *Gazette* there appeared a report setting out in detail particulars of the sale of a number of lambs' carcases which had been forwarded with the object of testing their value on the London market. These carcases comprised a number of different crosses, representative of both "first and second" crosses. With the exception of the first crosses, which were sent primarily with the object of contrasting their value with the second crosses, the breeds there included are dealt with under Group II of the present scheme. As intimated in the report referred to, the first crosses were considered by brokers to be unsuited to trade requirements, and breeders were strongly advised not to export first-cross lambs unless they were prepared to market them as third grades. This further endorses the allotment of breeds for special requirements, and in view of these distinct and rapidly increasing market demands, there is emphasised the urgent necessity, in dealing with breeds of varied characteristics and dispositions, of the adoption of a definite basis of classification.

As a further exposition of the method adopted in this scheme of mating, it might be stated that the breeds employed in Group II find their use by mating with the progeny evolved from those included in Group I. It becomes evident, therefore, that the breeds and crosses comprised in the latter are of infinitely greater importance than those included in the former, since the second cross is dependent on the first cross for its existence. The tables which are here inserted set out the whole scheme, and will make these relationships quite clear.

Table II deals with the raising of the export lamb, while Table I confines itself to the development of both wool and mutton. Since the breeds included in the second group fall into their natural order by mating with the ewe progeny of the different crosses specified in Table I, the use of the Down or Shortwool breeds is, so to speak, restrictive, while that of the Longwool is continuative. This being the first correlated report on the

Cross-breeding Experiments with Sheep at Wagga Experiment Farm—Group I.

TABLE I shows the rate of increase from Merino Ewes when mated with Longwools—British breeds—for a period of four years.

Rams.		1910.				1911.							1912.							1913.						
			Cross-breds. Increase estimated at 70 per cent.					Cross-breds. Increase estimated at 70 per cent.							Cross-breds. Increase estimated at 70 per cent.							Cross-breds. Increase estimated at 70 per cent.				
			Ewes.	Wethers.				Ewes.		Wethers.					Ewes.		Wethers.					Ewes.		Wethers.		
Breeds.	Number.	No. of Merino Ewes.	To Keep.	To Sell.	To Keep.	No. of Rams.	No. of Merino Ewes.	To Keep. In-crease	To Keep. Total.	To Sell. In-crease	To Keep. In-crease	To Keep. Total	No. of Rams.	No. of Merino Ewes.	To Keep. In-crease	To Keep. Total.	To Sell. In-crease	To Keep. In-crease	To Keep. Total.	No. of Rams.	No. of Merino Ewes.	To Keep. In-crease	To Keep. Total.	To Sell. In-crease	To Keep. In-crease	To Keep. Total.
Lincoln	1	50	18	11	6	1	58	20	38	14	6	12	2	68	24	62	18	6	18	2	68	24	86	18	6	24
Leicester	1	52	18	12	6	1	56	19	37	13	6	12	2	66	23	60	17	6	18	2	66	23	83	17	6	24
Border Leicester..	1	50	18	11	6	1	56	19	37	13	6	12	2	66	23	60	17	6	18	2	66	23	83	17	6	24
	3	152	54 a	34	18	3	170	58	112 b	40	18	36	6	200	70	182 c	52	18	54	6	200*	70	252 d	52	18	72
For comparison—			To Sell.					To Sell.																		
South Down ..	1	12	4	..	4	1	10	4	..	..	3	7														
Shropshire ..	1	12	4	..	4	1	10	4	..	..	3	7														
Hampshire ..	1	12	4	..	4	1	..	..	..	..	.	..														
Dorset Horn ..	1	12	4	..	4	1	10	4		.	3	7														
	4	200	16	..	16	4	200	12	..	..	9	21														

* These ewes could be sold at the end of the breeding season.

a, b, c, d. These correspond with the numbers used in Group II.

Cross-breeding Experiments with Sheep at Wagga Experiment Farm—Group II.

TABLE II shows how Cross-bred Ewes may be utilised for a period of four years in the raising of Export Lambs, which should be marketed at from four to five months old.

Rams.		1911.					1912.					1913.					1914.			
		Cross.					Cross.					Cross.					Cross.			
		Lincoln-Merino.	Leicest'r-Merino.	Border Leicest'r-Merino.			Lincoln-Merino.	Leicest'r-Merino.	Border Leicest'r-Merino.			Lincoln-Merino.	Leicest'r-Merino.	Border Leicest'r-Merino.			Lincoln-Merino.	Leicest'r-Merino.	Bo·der Leicest'r-Merino.	
Breeds.	Number.	No. available.	No. available.	No. available.	Total available.	No. of Rams.	No. available.	No. available.	No. available.	Total available.	No. of Rams.	No. available.	No. available.	No. available.	Total available.	No. of Rams.	No. available.	No. available.	No. available.	Total available.
		18	18	18	54		38	37	37	112		62	60	60	182		86	83	83	252
South Down	1	6	6	6	18	1	13	12	12	37	2	21	20	20	61	2	29	27	28	84
Shropshire	1	6	6	6	18	1	13	13	12	38	2	20	20	20	60	2	29	28	27	84
Dorset Horn	1	6	6	6	18	1	12	12	13	37	2	21	20	20	61	2	28	28	28	84
	3	18	18	18	54 a	3	38	37	37	112 b	6	62	60	60	182 c	6	86	83	83	252 d

a, b, c, d. These correspond with the numbers taken from Group I.

new scheme, my purpose is to make this point perfectly explicit, in order that breeders might clearly comprehend what is being aimed at in determining the class of sheep most suitable for specific demands.

We have now to consider in full detail the breed and crosses comprised in Group I. The progeny here is designated the wool and mutton type. The object will be to compare their relative merits, and to contrast their physical differences, so far as the results to hand will permit. On a basis of body weight and early maturity, as opposed to weight, length, quality, and consequent value of fleece, the more prominent characteristics of these breeds are being investigated. Those included comprise the Lincoln (L_1), Leicester (L_2), Border Leicester (L_3), and Romney Marsh (L_4). A more detailed account of their general physical characteristics, and the principles regulating their classification, is given in the Bulletin No. 53, issued by the Department of Agriculture, which deals with the cross-breeding of farmers' sheep The pamphlet referred to is now issued as Part I, and the object of its publication was mainly to enable breeders to see to what purpose, and with what probable results, breeds were being tested, preparatory to the carrying into effect of the work now under review. At page 29 (Chapter III) the Longwools have been classified on a basis of their wool and mutton value. Exclusive of their other distinguishing features, these breeds are named in their natural order of improved quality, but decreasing fleece production and increasing early maturity. Cotswolds and Cheviots also are included, and with regard to the last-named it should be noted that this breed is a slight exception to the rule. Though somewhat finer in the wool than either the Border Leicester or Romney Marsh, it is, nevertheless, lighter in body, and in consequence later in maturity than either of these two breeds. Both Cotswold and Cheviots have been tried alongside the other members of the group for crossing purposes. Whilst serviceable enough in themselves, the results show that any place they might fill under average conditions could be more profitably taken by any of the other breeds Thus, of the breeds now under observation by way of contrast, the lighter fleeced but heavier bodied Border Leicester (L_3) is being tested side by side against its close relative, the coarser fleeced Leicester (L_2), while the extremely coarse and generally speaking lighter bodied Lincoln (L_1) is being seen alongside each of these breeds for mating with the Merino under identically the same conditions. Though the Romney Marsh (L_4) is included among the number, and in respect to weight of body and length and quality of fleece, ranks with the Border Leicester, this breed is not being tested at all the farms. Being particularly well adapted to damp pastures and severer conditions, it finds its more profitable use in the colder and wetter districts of the State. The Romney Marsh therefore comes under observation in the trials at Glen Innes.

Period of the Investigations.

The experiments have been planned to extend over a period of five years. This allows for the average age up to which a ewe may be profitably bred

from, and also provides for any variability there might be experienced in contrasting one year with another. The manner, therefore, in which early or late maturity comes to operate, and the extent to which it affects fleece production, as represented in the breeds mentioned, can in this way be worked out in the different crosses. Representative specimens of wether as well as ewe progeny are being carried over the whole period for which the experiments have been planned. The ewes, of course, are bred from, but the wethers are kept as a means of checking their development from year to year in comparison with the ewes. It does not, however, necessarily follow that the wether should be kept for the full term before marketing, but by a comparison of the body and fleece weights of the wethers of all crosses, and taking each year during the continuance of the trials, at the conclusion there should be available sufficient data to determine in each cross the most profitable age at which the sheep should be marketed. Likewise, the most valuable cross in the ewe that will provide the foundation from which to raise the early lamb should be clearly defined. Moreover, by dividing breeds into separate groups, and by systematically recording the essential particulars, it should be possible for each breed to work out its own destiny, once having decided the group to which it belongs, the ewe with which it should be mated, and the market to be catered for.

First put into operation with the mating season of 1909 at one farm (Wagga), a year later in the case of Cowra and Bathurst, and, with only a few months' difference in the case of Glen Innes, final conclusions cannot, of course, be drawn, but the results available for the intervening period can be briefly summarised.

Districts Represented.

The experiments have been arranged to occupy as wide a range of climate as possible. All farms that are conveniently situated within districts suitable have been chosen for the purpose. Those represented may be taken as a fair criterion of the various regions where cross-breeding might be profitably undertaken.

Although presenting certain variations, both in respect to soils and pastures, as well as in topographical features, yet those represented are sufficiently typical of the different climates of the State to give effect to such a plan. Thus the breed or cross that would succeed at Wagga Experiment Farm would approximately serve for a wider range of country, taking Wagga as a centre.

Wagga represents, perhaps, the most important centre of our observations. Few districts of the State offer better prospects for the successful undertaking of a mixed farming proposition. The seasons are certainly variable, but no more so than any other district similarly situated. Already wheat-growing has become a settled industry, and it is only necessary that the farmer should realise that he cannot continue indiscriminately cropping his land without alternating with stock. This being so, the question as to the most profitable breed or cross must enter more fully into the scope of his

operations. For many years prior to the advent of wheat culture the country for the greater part was thought of little value except for wool-growing, and for this purpose the Merino was almost wholly used. But when wheat culture was seriously entered upon, coupled with the great expansion which during later years has taken place in the export of mutton, the cross-bred sheep in most of the more favoured localities has almost entirely replaced the Merino. Still, though much of the country is especially well adapted to the raising of cross-breds, there are yet many localities that could still be more profitably left to the Merino.

To those less acquainted with the surroundings, a short description of these particular parts will perhaps enable the point to be more clearly understood. Generally speaking, the country is flat, but to the eastern extremity the formation varies from a series of gently undulating slopes descending from the highest points to a gradual expanse of wide, uninterrupted plain. The country to the east is cold, while that to the west, especially during the summer, is hot and dry. While many of the slopes are of light carrying capacity, and in consequence more adapted to the finer classes of the Merino than the cross-bred, it is in the plains further west that the Merino appears to have found its natural home. Moreover, though the soils are rich and respond readily to moisture, taken as a whole, the district is subject to periodic visitations of dry spells. To the east, though perhaps felt acutely enough at times, the conditions generally make themselves less rigidly felt.

It is under dry conditions that the Merino is seen at its best. The mixed farmer can therefore very well, by adopting approved methods of cropping and feeding, confine his attention to cross-breds, leaving the Merino to the man who is working under natural conditions in the west.

Cowra represents another very important centre, and differs in many of the more prominent features from Wagga. Local variations in soils and pastures constitute the more outstanding differences. Situated on the western slopes, and lying contiguous to the tablelands, the climate is somewhat cooler than at Wagga. Lying midway between the hot dry plains of the west and the colder regions of the mountains, it represents a district typical of a very considerable area of the State. Consisting mainly of broad undulations and well grassed slopes, the district varies in its general outline from considerable elevations, leading down in places to rich flats and valuable river frontages. The slopes and uplands afford excellent pasture for stock, while nothing better could be found than the flats and river frontages for fattening. The district is noted for its lucerne, while clover and many indigenous fodder plants grow luxuriantly. The soils in general are rich and fertile, and almost anything in the way of cereals can be produced here. The soils at the Experiment Farm however, are only light to medium, and though there is a good variety of grasses, the pastures on the whole are somewhat poorer than at the Wagga Farm. Nevertheless, the district is admirably adapted to the raising of cross-breds, and local conditions should do much to determine the type most suitable for the district. Like Wagga, it is essentially an agricultural centre, and, lying close to railway communication, it possesses abundant facilities for

the raising of early lambs for export, as well as the wool and mutton types. Moreover, freezing works have been established in neighbouring towns. In fact, few districts of the State offer better inducements for a combination of wheat and sheep.

Bathurst is the next district that comes within the sphere of our operations. Located as it is, right within the heart of the tablelands, it possesses perhaps the most equable climate of any part of the State.

In this connection Bathurst may be cited as an example of a district representing the temperate mean, both from a physiological and climatic point of view, so far as sheep-breeding is concerned. Where proper methods are in force, cross-breds raised under local conditions show marked development, and already records go to prove that, given fair treatment, these classes furnish a wider margin of profit than the pure Merino, which when locally bred is small in frame, though fine in the wool.

As at Cowra and Wagga, considerable differences in soils and pasture, as well as in geological formation. exist. Ranging from tableland plains, intercepted by numerous depressions running between particularly abrupt gradients to high mountainous regions, it presents features quite in contrast to either of the districts already mentioned. It therefore presents two very important aspects from the conditions outlined. Local experience proves that whilst much of the district is suitable only for the Merino, in other localities there may be profitably developed the British breeds. Locally evolved types should therefore indicate the effect that climate exerts on type and crosses evolved in these regions.

Glen Innes comprises another separate region in which there may be contrasted the influence on both type and locality. Widely diversified conditions, embracing climate, rainfall, soils and pastures, are to be found here.

As a district it has features peculiar to itself. The summer is beautifully cool, but of short duration. Autumn is quickly ushered in, followed by a cold and protracted winter, when the ranges are often covered with snow. Spring seldom makes any impression upon the pastures before October, and little of the new season's growth is experienced much before November. Even then, unless the season be very favourable and early, the growth is scanty, and the brown tinge of the pastures, often seen late in the year, bears eloquent testimony to the severity of the slowly departing winter. The soils are heavy, and although productive under cultivation, are, whilst in their virgin state, sour, and the pastures, especially during the winter, very deficient in nutriment. This, together with the dampness of the climate, renders the sheep liable to disease. Already parasitic infestations, both internal and external, have been prevalent amongst the flocks, and only by thorough and systematic treatment can the various diseases be combated. Despite the severity of the conditions, the climate is nevertheless favourable to the British breeds especially to some of the Longwools. Their success, however, depends almost, if not entirely, on the growing of cultivated crops. Experience already gained under these climatic conditions goes far to prove that an adequate and suitable food supply will develop these breeds whereas

scanty and innutritious pasture will tend to diminish their most desirable qualities. Thus, to enable the stock to be successfully carried over the winter, there seems, under such circumstances, no alternative but to provide a sufficient supply of rich nourishing food for the sheep, or hand-feed them during the severest months. In short, English methods should here be applied to deal with what are practically typical home-country conditions.

Type.

A matter of greatest significance is here involved, not only in determining which breeds should be employed, but also in securing the most approved class of those represented as a basis of operations. Consistency is also another essential feature. Not only must those chosen be average specimens of the breed they represent, but they should also come of stock whose pedigree can be traced to a reliable source. Any laxity here might easily render the results unreliable and inconclusive. The securing of the right class of Merino was considered an all-important condition of success. Realising that the Merino ewes were to be mated with rams of much greater proportions than themselves, the object was to obtain the largest framed and deepest bodied class procurable.

Here a very important question naturally crops up in connection with cross-breeding. It is often asked why British bred ewes are not mated with Merino rams, instead of *vice versâ.* This certainly seems the more natural order in which to blend the desired qualities of these distinct races of sheep. Physically the British-bred ewe is much better fitted to suffer the strain of delivering a lamb to a Merino ram than is the case when the order is reversed. If mating were conducted in this way there would undoubtedly be less mortality amongst the ewes and lambs at the time of parturition. The progeny also would probably be better developed from birth. Apart, however, from the commercial aspect of the situation, there are other important considerations that must be fully taken into account. In the first place, while the Merino flocks of Australia may be calculated in tens of millions, those of the British breeds would scarcely number as many hundreds. Then again, whereas Merino ewes are always obtainable, and can be readily procured at a moderate cost, a much higher price is necessary for the purchase of the pure British stock. Moreover, the influence of climate and the predisposition which the race exhibits under our varying conditions, must also be taken seriously into account. Indeed, as viewed from the latter standpoint, it appears improbable that any of the British bred ewes will ever replace the Merino. As contrasted with the Merino ewe, the cross-bred is a much less ready breeder under average conditions. This is especially noticeable in the hotter districts of the States. How far this disposition would become accentuated in the pure-breds can only be left to conjecture from what is revealed in the cross-breds evolved from them.

Further, in order to secure uniformity, the ewes selected were as even in class as the offering permitted. Individual selection was resorted to, and

those chosen were carefully matched for length and quality of fleece, and shape and conformation of body. They were of the plain-bodied class, and carried little or no development about the neck. In wool they belonged to the coarser variety, in length about 3 inches, and in "count" of the "60's" standard. As near as possible a similar class was secured for each farm.

The Longwool Ram.

Equal attention was paid to the choice of the British-bred sires, and definite standards of these breeds were in each case duly recognised. Although all were fair average specimens, none could be regarded as high-class stud sheep; they may be taken as similar in class to those used by any ordinary breeder. Representative specimens of these standards will be found illustrated and described in Chapter III of the Bulletin previously referred to. There will also be found in the Bulletin a series of charts which will explain diagrammatically the meaning of the term "count," also the range or different qualities of wool which distinguishes these breeds and separates them from the Merino. A perusal of these particulars will enable the reador to more fully understand the essential features in which these breeds are being tested from a wool and mutton standpoint.

The Disposition of the Ram.

Whilst every precaution has been taken to have the experiments conducted upon as reliable a foundation as possible, yet certain inevitable individualities occur in all breeds, over which no definite control can be exercised. The very best judgment possible may be used in the art of selection, but nobody can foretell what the progeny will be. The laws of heredity are still, despite all efforts, faintly understood. Sometimes a ram will get stock superior to all others in the flock, indeed, as has often proved, even superior to himself. Whilst these conditions exist no provision can be made to guard against any such exceptions. The breeds, however, are being tested on a basis of their body and fleece values, and any irregularities could at once be detected in the succeeding generations. Morever, it should be borne in mind that breeds are not being tested at only one farm, but at different places. The results are worked out on the averages; any obvious inequalities in the progeny are balanced as far as possible in the results. The rams, as well as the different groups of Merino ewes with which they are mated, have their body and fleece weights taken at each succeeding shearing. These records are subsequently compared with those of their respective progenies. Then again, results are not based on the return from one or two years' operations, but over five years at least. Where a change of ram is necessary owing to his age or failure to breed, a careful check is kept of the progeny from the new ram. In the light of these facts, it seems altogether unlikely that the superiority or inferiority of any ram could materially affect the value of the result.

Period of Mating.

At Wagga and Cowra the rams are run with the ewes late in November. At Bathurst, however, the mating season is about six weeks later, so that, whilst in the two former instances the lambs are dropped during May and June, it would be July before the season finishes at the latter place. At Glen Innes the mating is still later. Generally, the rams are placed with the ewes in the autumn—usually in April—to enable the lambs to be dropped in September and October, when the worst of the winter is over.

The number of rams allotted to the ewes is, for the Wagga Farm, given in the table of mating on page 94. The proportion of rams to the ewes works out at about 3 per cent. for all farms. In some instances, where it has been found necessary to have a fewer number of ewes running together, this proportion has sometimes been increased. The number necessarily depends largely upon the age, condition, and disposition of the breed as signified in the ram itself. During the continuance of the experiments it has also been noted that the rams of the heavier-woolled breeds showed less inclination to stir amongst the ewes than the lighter ones, and this disposition was more in evidence as they grew older. The Lincoln was a big offender in this respect, and on this account on several occasions the rams of this breed had to be replaced by younger stock. Amongst some of the lighter-woolled types, the older rams worked equally as well as the younger ones. The Border Leicester showed here to considerable advantage. At Wagga the same rams of this breed were used for the whole period, yet at the close of last season, which was the final year for mating the Longwools with the Merino, they were as vigorous as at the outset. The natural increase in no wise suffered; in fact, it was above the average recorded for the other breeds throughout, and the progeny lacked nothing on the score of weight, shape, and general excellence as the sires grew older.

The Leicesters on the other hand appeared somewhat at a disadvantage in this respect. Indeed, at Wagga, though only two years old when purchased, the two rams of this breed became practically worthless after two years' service. This breed, however, showed to better advantage at Cowra, where the rams have been bred from up to the age of five years.

Of the Shortwools, the Dorset Horn has shown consistent activity amongst the ewes at every farm where it has been tried. This apparent hereditary predisposition was to be observed not only in the rams of all ages, and doing service amongst ewes of other breeds, but also among the ewes of their own breed, in which case the fecundity is remarkable.

The Shropshire, on the other hand, is by far the less ready breeder. As seen under semi-arid conditions, the apparent tendency is for this failing to become more accentuated as the animal grows older, and as the breed becomes acclimatised. Though the two breeds are closely related, yet no exception could be taken to the South Down in this respect. This breed has shown marked adaptability, and appears equally as much at home in the hotter as it is in the colder climates.

The Disposition to Breed.

How long the rams should be allowed to remain in company with the ewes constitutes another branch of inquiry. To the breeder striving to secure a uniform and satisfactory lambing, success depends largely upon his knowledge of existing conditions. The cross-bred ewe under average Australian conditions is a much less ready breeder than the Merino, which in its pure state, will join with the ram practically at any time, but shows an inclination to mate during the hotter months.

The length of time, however, during which the rams should be run with the ewes may be regulated from a more exact knowledge of the frequency of sexual heat among the ewes of the various breeds. All breeds are not alike in this respect, and it seems evident that the instinct varies under different degrees of temperature.

Tests in individual mating have been carried out at the Yanco Experiment Farm in connection with the Merino. The trials were continued for eight weeks, and somebody remained in attendance throughout. The records disclose sexual heat as reappearing between the thirteenth and twentieth days, in the majority of cases on the seventeenth. The records further indicate that the ewes remained in this state for about twelve hours, though in some cases it was much shorter than this, and in other instances it remained for upwards of two days.

To what extent this disposition is liable to become modified by climate and environment in the different breeds is, in the absence of definite records, largely open to conjecture. The point, nevertheless, is worthy of fuller investigation, as the question has a very significant bearing on the rate of natural increase.

From what we know of the Merino it is obvious that the breed retains all the natural instincts of successfully and prolifically reproducing its like under the great majority of Australian conditions. Proof of this is afforded by the readiness with which the ewes will mate during practically the hottest months of the year, and also from a consideration of the consistent comparatively high rate of increase recorded annually from far western areas, though the flocks are depastured over wide tracts of country, and in consequence the ewes are never in very close confinement with the rams.

Further evidence is afforded by observation made with the Merino flock at the Nyngan Experiment Farm. It was noted that the ewes had a recurrence of sexual heat on or about the twelfth day, and that the time during which they remained in this state was correspondingly shorter. It would, therefore, appear that, so far as the Merino is concerned, the hotter the region the shorter the interval between the occurrences.

This, however, is not the case with regard to the majority of the British breeds, nor, though perhaps in a smaller degree, their cross-bred derivatives. Not only do the rams of the pure breeds exhibit less animation amongst the ewes the hotter the climate, but the ewes themselves refuse to mate except during the cooler months. This condition has already asserted itself in warmer climates, especially so with breeders situated in the far west, and,

unless modified by acclimatisation, it threatens to oppose the development of these breeds beyond a certain boundary-line of temperature. Already a number of breeders have been compelled to relinquish their use on account of their inability to induce the ewes to breed at the desired period of the year.

This characteristic is hardly so pronounced in the cross-bred as in the pure-bred, and depends very largely upon the proportion of British ancestry represented in the cross.

Where lamb-raising for export is the objective with breeders located in the warmer districts, the drawback is at once obvious. Breeders here aim at the early disposal of the year's drop for two main reasons: The first is to get rid of the lambs intended for sale before the grass-seeds become troublesome; and second, their districts being early they can secure high prices with the first of the season's drop. Instead, therefore, of having the lambs ready for disposal early in spring, as is the case where the Merino ewe is employed, it is late spring, and very often midsummer before they are ready for sale, owing to this disposition of the cross-bred.

The opinion is sometimes advanced that the cross-bred ewe is a less ready breeder because it is too fat, but this idea is disposed of when it is remembered that the ewes will mate during the cooler months when they are equally fat. The real reason is probably the fact that these breeds have not been sufficiently long established to enable them to break away from the traditions of their ancestral environment. Whether they, in the course of time, will conform to the changed conditions of their new home remains to be seen, and will depend on the extent of their adaptability to circumstances.

The writer's view is, that the British pure-breds will always be more ready breeders in those districts where the lambing season is later, while the cross-bred is far more likely to conform to the conditions which lie between extreme heat and temperate cold.

Experience gained in transferring a flock of Lincolns, which may be taken as representative of a cold country sheep, from the warm dry climate of Wagga to the colder district of Glen Innes tends to confirm this. For two years, while stationed at the former place, the ewes failed to produce any increase, though the rams were changed during the interval. On being removed to the cooler climate, the percentage of lambs recorded for the two years was 70 per cent. and 120 per cent., respectively. The rams were allowed to remain with the flock for two months, and a strict watch was kept over the ewes, with the result that it was noted that in the ewes not pregnant sexual heat recurred every third week.

It seems useless to resist the conclusion that unless the characteristics of the pure-breds can be modified by climate and environment, the breeding from cross breds must largely be restricted to the temperate parts of our State.

The length of time during which the ram is associated with the ewes must necessarily be regulated with due regard to this condition. A longer term is required for the cross-bred than for the Merino, seeing that both are joined with the rams, in order to fit in with local conditions, at the same time of the year.

Sufficient time must always be allowed to enable those ewes which have missed on the former occasion to mate. In Merino flocks the rams are usually withdrawn within six weeks, but with cross-bred ewes it is advisable to leave them in for three or four weeks longer. The rams should also be kept in as close company with the ewes as possible. Yarding the flock over-night will facilitate in this direction.

To secure effective service it may be necessary to supply the ram with more nourishing food, and in the case of the ewes either a richer food supply or placing them on a green crop for a few days results in a considerable improvement in this respect.

At all the farms where the experiments are in operation a uniform system of ear-marking is adopted, by which not only are the different crosses distinguished from one another, but also the Merino ewes constituting the different groups. This ear-marking is supplemented by a system of tattooing numbers in the inside of the ears, and thus it is possible to trace the development of any particular animal from the time of the first weighing when a month old until it is excluded from the trials.

(To be continued.)

Mites and Lice in Fowls.

A correspondent in referring to the articles by the Poultry Expert on poultry vermin states that the chief pests in the Wyong district are the fowl lice and a minute red insect, a little smaller than the lice. He was, however, anxious to know whether the lice travel any distance from the fowl-houses and could live and increase away from the fowls. For instance, supposing a fowl-house is left empty, was it possible for the lice to increase and live there for an indefinite time if no steps are taken to destroy them.

In reply, Mr. Hadlington, Poultry Expert, stated that the minute insects to which reference is made are known as "red mites."

Neither the mites nor the lice referred to can exist if they cannot have access to the fowl; but a fowl-house would remain infested with them for some time after the removal of the birds, possibly from two to four months, according to the extent of infestation and to other conditions, such as weather and excrement left in the house. In the absence of excrement, however, they die out much more quickly.

There is no fear of the insects transferring themselves from a fowl-house to any other building, unless there are fowls roosting about the latter, in which case the insects would follow the fowls. They cannot live long without the fowl, and will not increase, except in so far as eggs—which had been laid prior to the removal of the birds—are hatching out. Cut off their food supply and they die out.

Scale of Points for Judging a Mixed Dairy Farm.

The Bowraville Agricultural Association having suggested giving a prize for the best farm on the Nambucca, which must include dairying, wrote the Department for a scale of points suitable for such a competition. As a result, Messrs. M. A. O'Callaghan, Dairy Expert, and Hugh Ross, Chief Inspector of Agriculture, compiled the following classification, which may be of value to other societies.

	Points.	
A. *Management*—		
1. Checking production and quality of dairy produce and the working of dairy machinery	25	
2. Supervising, feeding, and watering of stock; making provision in the way of both fodder and pastures (calf-feeding methods to have special attention)	30	
3. Attention to breeding with a view to improving yields and supply of heifers for future; supervising, with a view to disease prevention in calves, cows, &c.	35	
4. Book-keeping and milk record keeping; stud books for cattle and pigs	10	
	——	100
B. *Stock*—		
1. Cattle: quality and type, taking into consideration the character of land, and purposes for which cattle are used, viz., cheese, butter, or town milk supply. Milk and butter yields to be taken into account	100	
2. Pigs	[illegible]0	
3. Horses	15	
4. Poultry	5	
	——	150
C. *Crops, including rotation, cultivation methods, and manuring*—		
1. Most suitable fodder crops for dairy cattle	15	
2. Other crops	15	
3. Yield	15	
4. System of cultivation, including manuring methods, rotation, and cleanliness of crop	15	
5. Freedom from disease in crop	8	
6. Trueness to type	7	
	——	75
D. *Pastures*—		
1. Improvement of pastures; most suitable grasses, sown according to locality; grass experiment plots	50	
2. Subdivision into most suitable paddocks	25	
	——	75
E. *Buildings and Fences*—		
1. Dairy and bails	18	
2. Homestead	12	
3. Piggery and poultry farm	10	
4. Fences and gates	10	
	——	50
F. *Machinery and Implements*		50

Grand Total ... ... 500 points.

The Sheep Maggot Fly
(*Calliphora rufifacies*)
and its Parasite.

WALTER W. FROGGATT, F.L.S., Government Entomologist.

THE establishment of the Sheep Maggot Fly Experiment Station by the Minister of Agriculture last September marks a very important stage in the development of Economic Entomology in Australasia.

A scheme of action had been previously drawn up by a Committee consisting of the Chief Inspector of Stock, the Wool Expert, and the writer, which was approved by the Under Secretary, and has since been carried out under my supervision. This has eventuated in the formation of the present Government Experiment Station at the Crutching Yards, about six miles from Messrs. W. and T. Dickson's homestead of Yarrawin Station, and it is largely owing to the assistance and co-operation of these gentlemen that so much investigation work has already been done.

The district of Brewarrina was chosen on account of its being one of the north-western areas in which the sheep maggot flies have been a very serious pest for some years. The camp outfit consists of four large tents, one of which is fitted up as a laboratory for chemical and entomological investigation. As it was considered that the bio-chemical side of the question, in working against the sheep maggot, was very important, J. L. Froggatt, B.Sc. of the Sydney University (a son of the writer), was appointed by the Public Service Board as officer in charge, and has submitted two interim reports up to the end of the year 1913.

In the first records of sheep maggot flies in Australia this species (*Calliphora rufifacies*), which, for want of a better name, we have called the "Metallic Blue Blow-fly," was not one of those known as an active agent in the work of blowing soiled wool on living sheep. It was not among those recognised as sheep flies in the paper, "The Sheep Maggot Fly, with notes on other Common Flies," published in the *Gazette* for January, 1905, and as late as 1910, when I furnished another contribution, "Sheep Maggot Fly in the West," we had not bred this species from maggots in soiled wool, though in the west it was very plentiful about killing yards, freshly-skinned sheep, and dead animals.

The publication of the notes in 1910 brought much interesting information and material from sheep-owners, and we soon found from the infested wool thus received that the so-called "hairy maggots," well known to the squatters, were the larvæ of this fly, and that it also bred in soiled wool. But at that date they were not as common as the two other species of yellow house blow-flies, *Calliphora oceaniæ* and *C. villosa*, which up to this date had been the chief culprits.

This is another case of the adoption of new habits by a previously harmless insect, on account of new conditions arising, through the presence of smelly wool. From our present investigations in the north and western districts of this State, and Western Queensland, it is evident that this is now the common sheep maggot fly, while the two other species, from which it probably first acquired the habit, have almost disappeared from this great area, and, at the time of writing, certainly do very little damage in comparison with this species.

In fact, many of the so-called "smooth maggots," typical of the domestic yellow blow-flies, we have recently discovered, are the larvæ of another metallic-tinted blue-green fly, belonging to the distinct genus *Lucilia*, and identical with the sheep maggot fly of England (*Lucilia sericata*). This is one of our common introduced "green bottle flies," a common meat-blowing pest about Sydney and suburbs, but in earlier investigations it had never been noted in the west or north-west, though now well established

The "Metallic Blue Blow-fly" or "Hairy Maggot Fly" (*Calliphora rufifacies*) is about one-third of an inch in length, but varies considerably in size, as starved specimens are often much smaller. In general coloration it is a deep metallic blue, but sometimes shading into green tints on the abdomen; the legs are black, the wings transparent, with the basal cells close to the thorax clouded, and the nervures black. The space between the eyes is black, with the rest of the head dull yellow, but clothed with a fine white down. The bristles covering the head, thorax, and abdomen are black, with very few upon the dorsal surface of the thorax, the under surface of the fly clothed with finer downy hairs, which form a grey coat on the thorax and first segment of the abdomen.

The maggot is dull light brown to dirty white: the dorsal surface darkest on account of the numbers of minute black spines that form regular black bands across the cephalic and thoracic segments, with all the following abdominal ones covered with patches of similar spines, forming almost a tuft at the tip of the anal segment. The whole of the epidermis is finely shagreened, the ventral surface rugose, with the number of minute black spines forming irregular transverse bands across the centre of the segments Head comparatively small, contracted behind; black, recurved jaws, moderate in size. Thoracic segments narrow at junction with head, second and third swelling out to the abdominal ones; segments well defined on the sides, broadest to the fourth abdominal, rounded to the anal segment. Along the edge of the front margin of each segment from behind the head a transverse band of long, blunt, fleshy tubercules, smallest on the thoracic segments, and rounded. The abdominal segments furnished with eight larger, longer tubercules, with a corresponding row of eight smaller ones on the ventral surface. Spiracles distinct in the centre of a depression on the eighth segment. Adult maggot measuring about five-eighths of an inch in length. It is the curious fringe of fleshy tubercules that give these larvæ the popular name of "hairy maggots."

The pupa varies from dark brown to almost black, and in general form is flattened, but slightly convex on either side, with the aborted tubercules forming an irregular coat of roughened processes or blunt spines They are often found sticking to the damaged wool, and though some may remain on a damaged fleece on a blown sheep after they have pupated, the bulk of them fall to the ground in the same manner as with those of other species. When dead animals are found in the paddocks, large quantities of the pupæ may be found under and around the edge of the carcase, but in small animals such as rabbits, and birds, they generally pupate well under the soil beneath the remains upon which they have developed.

The Green Bottle Fly (*Lucilia sericata*).

This is the well-known English sheep maggot fly. It was probably introduced into Australia at a very early date, and is very common about Sydney and the suburbs, where these bright coloured flies are very noticeable resting on the ground feasting upon any offal or decaying vegetable or animal matter.

It also comes into the house at times and blows meat, and seems to have a very keen sense of smell for any kind of tainted food.

At first sight it might be easily confounded with *Calliphora rufifacies,* but on comparison with this species it will be found that the colour has a more distinct green tint, while the spines or stiff hairs are much more abundant all over the thorax and body, particularly on the back and pronotum. There are no fine downy hairs on face or body, and there is usually a pale whitish bloom on the front margin of the prothorax behind the head, that is never seen upon the hairy maggot fly.

The maggots are smooth and cylindrical, without the fleshy tubercules, and closely resemble the larvæ of the two common yellow house blow flies. White, sometimes semi transparent, elongate, with pointed head containing the black curved retractile jaws, and the anal end bearing some short, rounded tubercules and the pair of spiracles.

The pupa is smooth, of the usual oval shape, and dark brown tint. The life history has been closely observed from the eggs of specimens blowing exposed meat in Sydney. Eggs laid at midday were active maggots in six hours, the maggots on meat are full fed in six days, when they pupate and the perfect fly emerges on the sixth day after the maggot has pupated

This species is the sheep maggot fly of Great Britain, and has been a pest chiefly in Ireland and Scotland from a very early date, but has never been recorded from the wool or wounds on sheep until now. At the Yarrawin camp it was identified coming to meat baits, and later on was found in our breeding jars emerging from wool containing smooth maggots taken from a badly blown ram.

We have, therefore, another species of blow-fly that is taking a hand in blowing soiled wool.

Parasites.

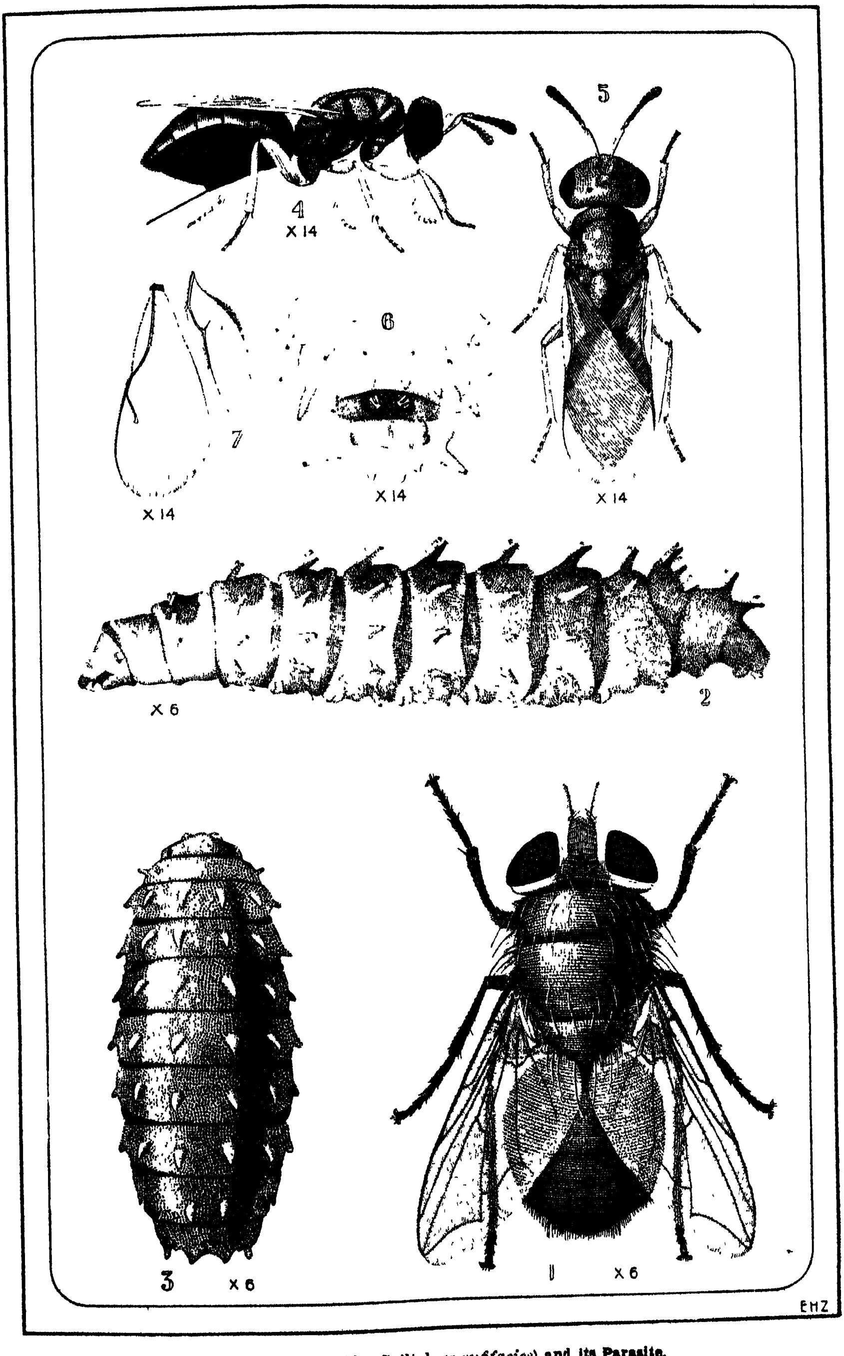
The discovery of an effective parasite infesting the larvæ and pupæ of the sheep maggot fly (*Calliphora rufifacies*) is a very important event in the

work of the Government Sheep Fly Experiment Station at Yarrawin, and one that may possibly lead to new methods of control. In this case we have a native parasite attacking another indigenous insect under natural conditions and surroundings, when the pest is in an early stage of its development and has done no damage to the wool. There is no question in this case of going to a foreign land to collect an unknown parasite, travel by land and sea to its new home, and turn it out in a strange land where it has to fight against new enemies; we have it well established right among its food supplies.

The infested fly pupæ were collected under the remains of a dead foal that had died in the paddock just five weeks previously, so that allowing that the eggs were deposited on the day of its death, the whole life cycle of the chalcid parasite would be compressed in four weeks, as the perfect chalcids were ready to emerge when the pupæ were collected, but we have now proved that their life cycle is still shorter. The dates are as follows:—The foal died about 8th October; the remains were examined by us on the 19th November, when the remains were still putrid where resting on the soil, but the sheep maggot flies had emerged from all the pupa cases that had not been destroyed by the parasites. The remaining ones contained the remains of dead sheep flies, or the maggots, pupæ and the perfect chalcid wasps just emerging. The two lots of fly pupæ can be easily separated, as those from which the flies have emerged have the end of the pupa case torn off, whereas those from which the parasites emerge have a small circular hole like a pin prick in the side of the pupa case, but the ends are intact.

Parasitised fly pupæ examined on the 20th November, contained an average of 20 pupæ, larvæ or perfect parasites, active and ready to emerge when the pupa case was broken. Large quantities of the parasitised pupæ brought down to our Entomological Laboratory at Sydney, were found to be swarming with these active little wasps, which had emerged in the tins on the journey from the Government Experiment Station at Yarrawin. These parasites were removed into clear circular lamp glass chimneys, plugged with cotton wool at both ends, and fed with sugared water placed on a bit of linen rag on the inside of the glass cylinders. A quantity of pupæ of our common blow-flies (*Calliphora villosa* and *C. oceaniæ*), which had been bred from blown meat for the purpose in our laboratory, were placed in the bottom of the glass cylinder, which was left on its side for observation The work of copulation went on for about two days before the female chalcids, which are much larger than the males, commenced to actively deposit their eggs in the fly pupæ provided for them

Mr. McCarthy, who has had charge of this very interesting work, considers that most of these fly pupæ were parasitised from the 7th to the 11th December, and the first of the second generation began to appear in the jar on the 18th of December, and were swarming out in hundreds on the 22nd December, so that the second generation, under close observation, took about eleven days to develop from the egg to the perfect wasp.



The Sheep Maggot Fly (*Calliphora rufifacies*) and its Parasite.

Another important point in the breeding of these parasites is that they increase enormously under artificial breeding conditions, the freshly-bred pupæ of the house blow-flies being much more heavily parasitised than the "hairy maggot" pupæ from which the first generation was obtained.

The pupæ parasitised under artificial conditions can be easily distinguished from those that have not been infested, for wherever the pupa case is punctured by the needle-like point of the ovipositor a tiny drop of white matter exudes, and leaves a distinct spot on the brown pupal shell.

The egg of this parasite has not yet been examined, but the tiny naked dirty white larvæ are legless maggots of typical form, short and thickened in the centre, and smaller at the extremities. The pupæ are enfolded in a fine, close-fitting skin, showing all the outlines of the future perfect chalcid.

The perfect chalcid wasp is just one twelfth ($\frac{1}{12}$) of an inch in length; general colour dull metallic green, with rich metallic bronze and green tints in certain lights about the head and thorax; the antennæ springing out in front of head; the basal joints dull yellow to reddish, the last ten joints brown and covered with fine hairs, so that they look as if they were ribbed; eyes large, reddish brown; head, large; thorax, medium; legs covered with fine hairs, light yellow; wings transparent, covered with fine scattered hairs; nervures brown; body almost stalked at junction with meta-thorax, broadly rounded in centre, coming to a point behind. Most sheep men to whom these parasites have been shown say they look like tiny winged ants. They belong to the same order of insects, but are quite a distinct family.

DESCRIPTION OF PLATE.

1. Sheep Maggot Fly (*Calliphora rufifacies*).
2. Sheep Maggot Fly Larva ("Hairy Maggot").
3. Sheep Maggot Fly Pupa (showing aborted filaments).
4. Side view of Chalcid Parasite.
5. Parasite viewed from above.
6. Anal portion of larva of Sheep Maggot Fly, showing tubercules and spiracles.

Green Maize for Milking Cattle.

Green corn, if fed to milking cows before it shows the tassel, will do no injury, but it must be remembered that the greatest amount of nutriment is contained in maize when the cob is turning from the milky into the glazing stage. This, however, does not apply to any of the Sorghum family, such as Sorghum Saccharatum, Planter's Friend, and Amber Cane. These must on no account be fed to cattle unless in the flowering stage, or unless they have been allowed to wilt, that is to say, Amber Cane cut in the morning can be fed in the evening or if cut in the evening can be fed the following morning without any danger to the stock.—H. Ross, Chief Inspector.

Exportation of Plants to the United States of America.

The Federal Horticultural Board of the United States Department of Agriculture, in a communication forwarded to the Minister of Agriculture, draws attention to the requirements under the United States Plant Quarantine Act for inspection and certification of all nursery stock intended for shipment to the United States.

Inspection Certificates are required, signed on a proper official form by an authorised officer. The form of Certificate required is as follows:—

Original Certificate of Examination of Nursery Stock.

To Whom It may Concern.

This is to certify that the nursery stock included in this shipment, as per invoice attached, was inspected by ....

this .... day of .... 1914.

The stock was grown by ....

at ....

and is believed by the Inspector to be free from dangerous insects and plant diseases.

(Signed)

Duplicates of the above Certificate must be marked "duplicate" or "copy."

All packages of nursery stock intended for shipment to the United States should be plainly and correctly marked to show the general nature and quantity of the contents, the country and locality where the same was grown, the name and address of the shipper, owner or person shipping or forwarding the same, and the name and address of the consignee.

The following form illustrates the required marking number of permit:—

Exporter.......................... Name and Address ....

Importer (or broker) .... Name and Address ....

Ultimate consignee .... Name and Address ....

Grown in ....

General nature and quantity of contents :

To meet these requirements plants will be inspected at the Government Fumigator, foot of Bathurst-street, Sydney, where the necessary certificates will be issued.

Poisoning Sparrows.

Good results have invariably been obtained by using wheat poisoned with strychnine for the destruction of sparrows. Before the poisoned wheat is thrown to the birds non-poisoned wheat should be thrown out to them for, say, four or five days until they become thoroughly accustomed to the place. The poisoned wheat should then be thrown out, and no difficulty will be experienced in getting sparrows to take it.—H. Ross.

Varieties of Wheat and other Cereals.

Recommendations by the Department of Agriculture.

The annual conference of Departmental officers was held in Sydney on the 13th and 14th January, 1914, for the purpose of revising the list of varieties of wheat and other cereals recommended by the Department for cultivation, and of discussing other matters connected with the growing of cereals.

There were present:—Messrs. G. Valder, Acting Under Secretary and Director of Agriculture; H. Ross, Chief Inspector; G. M. McKeown, Manager of Wagga Experiment Farm; R. W. Peacock, Manager of Bathurst Experiment Farm; F. G. Chomley, Manager of Yanco Experiment Farm; M. H. Reynolds, Manager of Cowra Experiment Farm; A. H. E. McDonald, Manager of Coonamble Experiment Farm; C. B. Treflé, Manager of Temora Demonstration Farm; H. J. Kelly, Manager of Nyngan Demonstration Farm; A. H. McDougall, Manager of Condobolin Demonstration Farm; R. H. Gennys, Manager of Glen Innes Experiment Farm; J. T. Pridham, Plant Breeder; W. R. Birks, B.Sc., H. C. Stening and F. Ditzell, Inspectors of Agriculture; and J. W. Hadfield, Instructor in Agriculture, Hawkesbury Agricultural College. In addition, Mr. F. B. Guthrie, Chemist, and Mr. G. W. Norris, of the Chemist's Branch, were also present during portion of the proceedings.

The classification of the wheat districts of the State, as adopted at last conference, was again adopted, as follows:—

Classification of Wheat Districts.

1. Coastal (embracing those districts bordering on the coast, and which are specially subject to rust).
2. Northern Tableland (of which Glen Innes Farm is representative).
3. Central Tableland (of which Bathurst Farm is representative).
4. South-western Slopes and Riverina (of which Wagga Farm is representative).
5. Central-western Slopes (of which Narromine, Dubbo, Gilgandra, Wellington, Cowra, Grenfell, Forbes, and Parkes are representative).
6. North-western Slopes (of which Tamworth and Gunnedah are representative).
7. Western Plains (of which Nyngan Farm is representative).

Classification of Varieties of Wheat.

The following is a convenient classification of varieties of wheat, in respect of maturity, from a State standpoint. Obviously, there will be slight differences in various districts. The seasons for sowing are printed in heavier

type, but readers are recommended to refer to subsequent tables for their respective districts :—

Very Early.—Sunset, Bunyip, Florence, Firbank.

Early.—Comeback, Thew, Steinwedel.

[These should usually be sown late.)

Mid-season.—Bobs, John Brown, Cedar, Warren, Bomen, Federation.

[These should usually be sown in mid-season.]

Late.—Rymer, Marshall's No. 3, Zealand, Yandilla King, Cleveland, Huguenot.

Very Late.—Haynes' Blue Stem.

[These should usually be sown early.]

Varieties Recommended.

It was decided that the following varieties of wheat should be recommended for cultivation during the year 1914 :—

A.—Dual-purpose Wheats.

Recommended for both Grain and Hay.

Variety.	Period of Sowing.	Districts.
Bobs	Mid-season and late	Central Tableland; Central-Western Slopes.
Cleveland	Early and mid-season ...	Central Tableland; cooler portions of North-western Slopes, Central-western Slopes, and South-western Slopes.
Comeback	Late	South-western Slopes and Riverina.
	Mid-season and late	Central-western Slopes; North-western Slopes; Western Plains.
Firbank	Mid-season and late	Central-western Slopes; Western Plains.
Florence	Mid-season and late	Central-western Slopes; South-western Slopes and Riverina; North-western Slopes; Central Tableland; Northern Tableland; Western Plains.
Haynes' Blue-stem.	Very early	Northern Tableland.
Marshall's No. 3 ..	Early	South-western Slopes and Riverina.
	Early and mid-season ..	Central Tableland; Central-western Slopes; North-western Slopes.
Rymer	Mid-season	Central Tableland.
	Early mid-season	South-western Slopes and Riverina; Central-western Slopes; North-western Slopes.
Thew	Mid-season and late	Northern Tableland; Central-western Slopes.
Warren	Early, mid-season, and late...	Coastal.
	Mid-season	Northern Tableland; Central Western Slopes; North-western Slopes; Western Plains.
Yandilla King ...	Early	South-western Slopes and Riverina.
	Early and mid-season ...	Central Tableland; North-western Slopes; Central-western Slopes.

B.—Wheats for Grain only.

Not recommended for Hay.

Variety.	Period of Sowing.	Districts.
Bunyip	Mid-season and late	South-western Slopes and Riverina; Central-western Slopes.
	Late	North-western Slopes; Western Plains.
Federation... ...	Mid-season	Central Tableland; South-western Slopes and Riverina; Central-western Slopes; North-western Slopes.

C.—Wheats for Hay only.

Not recommended for Grain.

Variety.	Period of Sowing.	Districts.
Firbank	Mid-season and late . ..	South-western Slopes and Riverina; North-western Slopes.
Huguenot	Early, mid-season, and late .	Coastal.
John Brown ..	Early, mid-season, and late..	Coastal.
Steinwedel... ..	Early and mid-season ..	Western Plains; Central-western Slopes; and drier portions of South-western Slopes and Riverina.
Thew	Mid-season and late	Coastal; South-western Slopes and Riverina; North-western Slopes.
Zealand	Early	Central Tableland; South-western Slopes and Riverina; Central-western Slopes.

D.—Wheats Suitable for Green Feed and Soiling.

Variety.	Period of Sowing.	Districts.
John Brown ..	Early and mid-season ..	Coastal.
Huguenot	Early and midseason ..	Coastal.
Thew	Early, mid-season, and late .	Coastal; Northern Tableland; North-western Slopes.
Florence	Early, mid-season, and late...	Coastal.

E.—Wheats for Further Trial.

The following varieties were selected as being suitable for continued experiment at the Experiment Farms and in the Farmers' Experiment Plots:—

Variety.	Period of Sowing.	Districts.
Cedar	Early and mid-season ...	North-western Slopes.
Sunset	Late	Western Plains.
Bomen	Mid-season	Central-western Slopes; South-western Slopes and Riverina; North-western Slopes.
Genoa	Early and mid-season ...	Northern Tableland.
Canberra	Mid-season and late	Central-western Slopes; South-western Slopes and Riverina.
Nardoo	Mid-season	Central Tableland; Northern Tableland; North-western Slopes.

F.—WHEATS TO BE GROWN UNDER IRRIGATION.

In experiments carried out by the Department, the following wheats have given the best results when grown under irrigation for hay and green fodder :—

(1) Zealand. (2) Marshall's No. 3. (3) Florence (late sowing).

These experiments are being continued in several districts.

Wheats for Districts.

The wheats recommended by the Department for various purposes may be grouped in districts as follows :—

1. COASTAL DISTRICTS.

[Embracing those districts bordering on the coast, and which are specially subject to rust.]

For Grain or Hay—
Warren (early, mid-season, and late sowing).

For Hay only—
Huguenot (early, mid-season, and late sowing) ;
John Brown (early, mid-season, and late sowing) ;
Thew (mid-season and late sowing).

For Green Fodder—
John Brown (early and mid-season sowing) ;
Huguenot (early and mid-season sowing) ;
Thew (early, mid-season, and late sowing) ;
Florence (early, mid-season, and late sowing).

2. NORTHERN TABLELAND.

[Of which Glen Innes Farm is representative.]

For Grain or Hay—
Haynes' Blue-stem (very early sowing) ;
Warren (mid-season sowing) ;
Florence (mid season and late sowing) ;
Thew (mid-season and late sowing).

For Green Fodder—
Thew (early, mid-season, and late sowing).

3. CENTRAL TABLELAND.

[Of which Bathurst Farm is representative.]

For Grain or Hay—
Marshall's No. 3 (early and mid season sowing) ;
Cleveland (early and mid-season sowing) ;
Yandilla King (early and mid-season sowing) ;
Rymer (mid-season sowing) ;
Bobs (mid-season and late sowing) ;
Florence (mid-season and late sowing).

For Grain only—

Federation (mid-season sowing).

For Hay only—

Zealand (early sowing)

4. SOUTH WESTERN SLOPES AND RIVERINA.

[Of which Wagga Farm is representative.]

For Grain or Hay—

Yandilla King (early sowing);
Marshall's No. 3 (early sowing);
Rymer (early and mid-season sowing);
Florence (mid-season and late sowing);
Comeback (late sowing).

N.B.—Cleveland (early sowing) is specially suitable for cooler portions of this district, such as Harden and Germanton.

For Grain only—

Federation (mid-season sowing);
Bunyip (mid-season and late sowing).

For Hay only—

Zealand (early sowing);
Thew (mid-season and late sowing);
Firbank (mid-season and late sowing).

5. CENTRAL-WESTERN SLOPES.

[Of which Narromine, Dubbo, Gilgandra, Wellington, Cowra, Grenfell, Forbes, and Parkes are representative.]

For Grain or Hay—

Bobs (mid-season and late sowing);
Marshall's No. 3 (early and mid-season sowing);
Yandilla King (early and mid-season sowing);
Rymer (early and mid-season sowing);
Comeback (mid-season and late sowing);
Florence (mid-season and late sowing);
Firbank (mid-season and late sowing);
Thew (mid-season and late sowing);
Warren (mid-season sowing).

N.B.—Cleveland (early and mid-season sowing) is specially suitable for the cooler portions of this district, such as Mudgee.

For Grain only—

Federation (mid-season sowing);
Bunyip (mid-season and late sowing).

For Hay only—

Zealand (early sowing)

6. North-western Slopes.

[Of which Tamworth and Gunnedah are representative.]

For Grain or Hay—
- Yandilla King (early and mid-season sowing);
- Marshall's No. 3 (early and mid-season sowing);
- Rymer (early and mid-season sowing);
- Warren (mid-season sowing);
- Comeback (mid-season and late sowing);
- Florence (mid-season and late sowing).

N.B.—Cleveland (early and mid-season sowing) is specially suitable for the cooler portions of this district, such as Inverell and Delungra.

For Grain only—
- Federation (mid-season sowing);
- Bunyip (late sowing).

For Hay only—
- Thew (mid-season and late sowing);
- Firbank (mid-season and late sowing).

For Green Fodder—
- Thew (early, mid-season, and late sowing).

7. Western Plains.

[Of which Nyngan Farm is representative.]

For Grain or Hay—
- Comeback (mid-season and late sowing);
- Florence (mid-season and late sowing);
- Firbank (mid-season and late sowing);
- Warren (mid-season sowing).

For Grain only—
- Bunyip (late sowing).

For Hay only—
- Steinwedel (early and mid-season sowing).

Classification of Wheat Varieties from a Milling Standpoint.

The wheats recommended in the foregoing list have been classified by Messrs. F. B. Guthrie and G. W. Norris, of the Chemist's Branch, as follows:—

New South Wales Strong White Wheats.
Bobs, Comeback.

Strong-Flour Red Wheat.
Cedar.

Medium Strong-Flour Wheats.
Bomen, Bunyip, Cleveland, Federation, Firbank, Florence, Haynes' Blue Stem, John Brown, Marshall's No. 3, Rymer, Sunset, Thew, Yandilla King, Zealand.

Weak-Flour Wheats.
Steinwedel, Warren.

Macaroni Wheat.
Huguenot.

VARIETIES OF OATS, BARLEY, AND RYE RECOMMENDED BY THE DEPARTMENT OF AGRICULTURE.

At the Departmental Wheat Conference, held on the 13th and 14th January, and attended by Managers of Experiment Farms and Inspectors of Agriculture, it was agreed to make the following recommendations:—

OATS.

Coastal.—Algerian.

Central Tableland.—Algerian, Carter's Royal Cluster, Potato, Abundance.

Northern Tableland.—Algerian, White Tartarian, Potato, Big Four.

South-western Slopes and Riverina.—Algerian, Red Rust-proof.

Central-western Slopes.—Algerian, Cape.

North-western Slopes.—Algerian.

Under Irrigation.—Abundance, Algerian.

Recommended for Further Trial.—Ruakura, Brown Calcutta, Sunrise, and Guyra.

BARLEY.

The following were considered good varieties of barley:—

FEED BARLEYS.—*Skinless.*—For green winter feed and grain for stock in districts with comparatively mild winters.

Cape.—For green fodder and grain for stock in the cooler districts.

MALTING BARLEYS.—*Standwell* has proved best at Bathurst Experiment Farm, and *Maltster* has given good results; but at Wagga Experiment Farm the best varieties have proved to be *Kinver, Golden Grain,* and *Goldthorpe,* in the order named. *Gisborne* (or *Duckbill*) was recommended for further trial at Wagga Experiment Farm.

RYES.

Black Winter.—For early winter fodder and grain.

White.—For collar-making.

It was pointed out that ryes are only suitable for cultivation on poor soils, generally in cold districts, for green feed. They are hardly suitable for grain at any time, as the yield is small.

PROFITS FROM DAIRYING.

MR. P. G. HAMPSHIRE, Dairy Instructor, recently visited the Hastings district, and noted that at Mr. W. T. Fowler's farm of 80 acres, at Rawdon Island, the return for the year ending 30th June, 1913, was £441, of which £120 was profit on pigs. The profit of the previous year was £547, and the falling off may be attributed to the exceptionally wet winter and shortage of feed. The stock comprised thirty-six cows in milk, and four breeding sows, and the owner works it entirely himself.

Starting a Poultry Farm

A correspondent who intends to start poultry-farming, and who wishes to avoid making any initial blunders, has submitted a series of questions. These, together with the replies by Mr. J. Hadlington, Poultry Expert, are given here for the guidance of other beginners.

Are August and September the only months in which it is desirable to hatch in order to get good laying results? Pullets hatched in August and September are fully 25 per cent. better layers than those hatched in any other months.

If a start is made with, say, twelve each of White Leghorns and Black Orpingtons of good strain, and these are hatched from continuously throughout the year, will the result of these hatchings make good stock birds from which to obtain eggs to hatch in the proper months? It is not advisable, nor is it profitable, to hatch continuously all the year round, and it might be stated that fowls hatched in other than the proper season are not likely to prove satisfactory as stock birds, and if this practice is persisted in the stock would degenerate in the course of a few generations. It is considered that hatching should not be carried out between 31st October and 31st March, although, for commercial purposes, there would be no objection to hatching from February.

It is proposed to purchase White Leghorns from one particular firm. Is it best to add any further stock that may be required from the same firm, or are better results likely to be obtained by mixing—that is, by purchasing stock from different sources? If care is taken to keep the one type of bird, there is less risk of introducing fresh blood. Type is the main factor carrying definite characteristics. Even at the risk of a slight decrease in egg-production, you cannot afford to breed too closely. The object should be to produce birds of good stamina as well as good layers, otherwise the efforts may result in disaster.

At what age are hens best for breeding purposes? Other factors being equal, hens at 2 years old are the most suitable for breeding purposes, but a younger male—say, from 10 to 12 months old—should be mated with them. However, any well-developed pullet is quite fit to breed from at 10 months, and with these you have the best chance of getting eggs, say, in July, for hatching chickens in August.

How many male birds should a pen of six hens have at one time, and how many should be available for twelve hens at one time? Six hens require only one male—in fact, this number of hens is not quite sufficient for a vigorous male bird. If the male bird is a vigorous one, and has a large pen in which it can get plenty of exercise, then from eight to twelve hens can be penned with it. If, on the other hand, the pen is a small one, and there is little opportunity for the bird to get any exercise, it is preferable to pen it with a smaller number of hens. The mating of the male bird with too few hens produces results just as bad as those obtained from mating it with too many. Two vigorous males are quite sufficient for twenty hens—at any rate, so far as Leghorns are concerned.

Harvest Report, 1913.

NYNGAN DEMONSTRATION FARM.

H. J. KELLY, Manager.

THE hay and wheat crops at this Farm for the season 1913 have proved to be highly satisfactory, more especially so when the extremely light rainfall of the last four months of their growth is taken into consideration.

During the autumn, and until the end of June, the rainfall was all that could be desired, but with July dry conditions set in, with exceptionally heavy frosts, which continued almost nightly until the end of August. These caused a check in the heavy growth of the crops resulting from the earlier very favourable conditions.

September and October were also very dry, and it was thought that in the face of such conditions grain could not mature; but although so dry the weather remained moderately cool, which most probably was the factor which permitted the growing crops to hold out until the 25th October when 45 points of rain fell. This welcome precipitation, supplemented by another 17 points on 28th October, benefited the grain crops considerably, and prevented pinching of the grain to any great extent when ripening.

The rainfall from 1st January to 12th November (when stripping was completed) was as follows:—

January ...	72 points.	July	29 points.
February ...	226 ,,	August	36 ,,
March	182 ,,	September ...	17 ,,
April	89 ,,	October	77 ,,
May	253 ,,	November ...	1 ,,
June	156 ,,		

From the above it will be readily seen that owing to the extremely light rainfall during the latter part of their growth, the crops could not be expected to yield very heavily, more especially the later sown ones. Nevertheless, the early plantings gave in most cases excellent yields of hay and very fair yields of grain.

Altogether 160 acres of wheat were planted, of which 46 acres were harvested for grain, yielding a total of 528 bushels, and averaging $11\frac{1}{2}$ bushels per acre, and 114 acres were harvested for hay, a total of about 173 tons being gathered therefrom, giving an average per acre of $1\frac{1}{2}$ tons.

Commercial Area.

A commercial area of 100 acres was planted in May with Firbank wheat, seeding at the rate of 25 lb. per acre, with superphosphate applied at the rate of 20 lb. per acre. From this area 85 tons of hay were gathered from 70 acres, and 354 bushels of grain were stripped from 30 acres.

Experimental Areas.

In these 60 acres were planted with various varieties, and under different cultivation and fertilising methods, and yielded 88 tons of hay and 174 bushels of grain The acreage harvested for hay and grain was 46 and 14 respectively.

The varieties which yielded most consistently for hay were:—Firbank, Florence, Steinwedel, and Warren, while for grain Sunset came easily first with 22 bushels per acre to its credit, from May planting, with seed at 22 lb per acre This variety has done exceptionally well here for the last two years, and if it continues in the future to yield as well on large areas as it has done with us in the experiment plots, it will increase the wheat yield in the areas beyond "the at present recognised wheat belt" to as great, if not a greater, degree than Federation has done in the "safe" wheat a eas

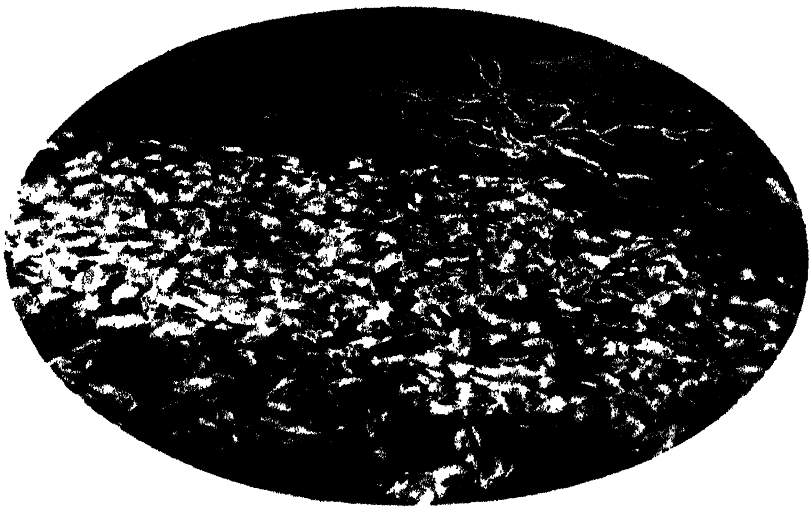
Light Seeding Essential.

The necessity for light seeding has again been most forcibly shown, as in almost every case seedings of 27 lb per acre and higher have given much better yields than seedings of 40 lb per acre and heavier.

The uncertainty of the rainfall in this district is so great that every precaution needs to be taken when entering upon agricultural pursuits. Light seeding will prove to be one of the greatest factors in profitable agriculture in this and similar districts, as in most seasons a stage is experienced during the growth of the crop when dry conditions prevail, and if sown heavily the crop is unable to secure sufficient moisture to carry it along without a check until rain comes. This means that if the crop is not a total failure at least reduced yields result Light sowings undoubtedly have the advantage in dry seasons, while in seasons of ample rainfall it has been proved that heavy yields can be obtained from comparatively light seedings

A new era for the West. Hay production at Nyngan.

Stacking.



A crop pest at Nyngan. 600 Galahs poisoned with wheat damped in milk and sprinkled with strychnine.

Farmers' Day.

NYNGAN DEMONSTRATION FARM.

Milk and Butter Records.

Under the United Pure Breeders' Association Scheme.

M. A. O'CALLAGHAN.

In last month's issue the records of the Darbalara Shorthorn herd were given, so far as had been completed up to date. These are the only Shorthorns entered that have completed a nine months' test.

The records of four of the Jersey breeders whose cattle have been tested during the past twelve months are published below, and it is intended to give, in future issues, records of other herds in order to be able, later on, to have a complete record of all the cattle that are being tested and that have passed the standard set down by the Association. When this is published in pamphlet form it will be a guide for breeders of the future to refer to, and it will be something which the breeders in other countries can study and rely on, as being accurate and representative of the cattle of this country.

As the dairying industry develops in South Africa there is little doubt but that Australia will be called on to supply a certain number of cattle for stud purposes, in addition to those supplied at ordinary rates for general dairying. It is only a couple of months ago that I selected a young Shorthorn bull to go to a well-known South African breeder, and as he comes from one of the best milking strains in the Darbalara herd, I have little fear but that he will help to advertise the best type of Milking Shorthorn cattle of New South Wales. I have recently had an opportunity of discussing South African possibilities with the Dairy Expert for the Union Government there, and am quite convinced that there will be considerable development, and that Australian cattle breeders will benefit if they make the best of their opportunities.

The Jersey breeders have come forward with their stock for testing in a way which must put the other breeders, generally speaking, in the background, and there is no doubt but that the useful little butter cattle are making greater progress in Australia than was at one time thought possible. The increasing price of meat may have a tendency to stem the onward march of the Jersey, but it is doubtful if dairy farmers on small holdings will seriously consider the question of raising steers, no matter what the breed is, while separated milk proves so valuable for pig feeding; hence I do not look for any material set-back in the increasing popularity of the Jersey and the Guernsey. The latter breed, of course, is too scarce, not only in this country but in England, to be availed of to a greater extent except for crossing purposes. The Americans have, practically speaking, "cornered" the Guernsey breed, and, owing to its great success and popularity in the United States, it looks as though the Americans will continue to practically absorb all the Guernseys of any value that are bred in the British Isles.

In giving the figures representing the herd of Mr. MacDonald, of Ingleburn, I desire to point out that his cow "Coomassie" has put up the best record of any animal of this breed so far.

RECORDS of Mr. C. R. G. MacDonald's Jersey Herd at Ingleburn.

Name of Cow.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of Test.	
					Milk.	Butter.
	Years.		lb.	lb.	lb.	lb.
Brighton Olive	3	7 Nov., 1912	5,686	316	17·50	1·06
Madeira VIII	9	2 Nov., 1912	6,685	482	18·50	1·69
Brighton Petal II .	1 year & 8 months	1 Nov., 1912	5,057	331	13·00	1·04
Exile's Queen	10	23 Dec., 1912	8,537	435	29·50	1·48
Coomassie	8	10 Dec., 1912	8,363	497	18·75	1·20
Ray's Primrose... ..	6	3 Feb., 1913	5,928	341	19·00	1·08
Brighton Petal	5	18 March, 1913	7,110	433	24·00	1·46

RECORDS of Miss E. C. Walker's Jersey Herd at "Yaralla," Concord.

Name of Cow.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of Test.	
					Milk.	Butter.
	Years.		lb.	lb.	lb.	lb.
Fuchsia III	8	23 Oct., 1912	7,573	403	15·50	1·00
Olive	4	8 Aug., 1912	6,058	424	17·75	1·37
Lady Capture	4	4 Dec., 1912	6,788	452	19·25	1·19
Cheerful	2	24 Dec., 1912	5,439	326	16·50	1·06
Princess of Yaralla ...	...	27 Jan., 1913	6,319	360	24·00	1·36
Butter Print	4	26 Feb., 1913	5,927	385	17·50	1·16
Leda's Snowdrop III ...	5	3 March, 1913	6,550	417	24·75	1·49

RECORDS of Mr. A. E. Brown's Jersey Herd at "Ingleside," Taloja, Bangalow.

Name of Cow.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of Test.	
					Milk.	Butter.
	Years.		lb.	lb.	lb.	lb.
Nina	5	25 Nov., 1912	4,199	240	4·50	·26
Beatrice II	6	7 Sept., 1912	4,881	235	5·00	·31
Daisy II	3	26 Sept., 1912	4,293	272	8·00	·53
Handsome	6	27 Sept., 1912	5,199	336	11·00	·72
Rosetta	..	24 Oct., 1912	4,632	255	7·00	·39
Cheerful III of Ingleside	3	13 Jan., 1913	4,321	224	16·50	·89
Opal II	3	31 Dec., 1912	4,101	247	10·00	·64
Kitty	9	27 Dec., 1912	4,113	236	11·50	·71

RECORDS of Mr. James Rixon's Jersey Herd at "Nashua," Richmond River.

Name of Cow.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of Test.	
					Milk.	Butter.
	Years.		lb.	lb.	lb.	lb.
Jasper	5	17 June, 1912	5,145	333	10·50	·88
Queenie	6	28 July, 1912	5,038	346	8·25	·81
Lily of Rockleigh ...	6	3 Aug., 1912	5,862	374	13·25	1·03
Rockleigh Rose	6	17 July, 1912	5,498	333	10·25	·80
Coral	6	3 Dec., 1912	5,143	286	5·25	·22
Dolly	5	1 Nov., 1912	5,553	357	2 50	·24
Sardius	6	9 Jan., 1913	4,552	303	15·00	·88

Jersey Cow, Coomassie.

The property of Mr. MacDonald, of Ingleburn.

Block kindly lent by The Dairy Bulletin.

MALTING BARLEY FOR THE DUBBO DISTRICT.

FOR districts such as Dubbo, Malting Barley should be sown at the beginning of May, using 40 lb. of seed per acre. Superphosphate is equally beneficial to the growth of a barley crop as it is for a wheat crop, as it has in nearly all cases increased the yield considerably. The richer classes of soil are best for barley, preferably where the rainfall is not less than 22 inches.—H. Ross, Chief Inspector.

CAPONISING.

CAPONISING is a practicable proposition under certain circumstances, such as, for instance, where there is a short hatching season (as in cold countries) with its consequent cheap and dear seasons for table poultry. In such a case it often pays to carry over a number of birds until they are, say, 7 to 10 months old, or even older; but even then cheap feed and an appreciative market for capons—where the price will be paid for choice table fowls of large weight—are necessary to make it a paying proposition.

The advantages of caponising are that you can carry over the birds and run them together like pullets without the risk of fighting, with its attendant losses, and the birds will be as tender at 10 months old or more as cockerels at from 5 to 6 months old. It is claimed that their flesh is better.

The main consideration, however, is the market for such birds. There would be but a very limited market in Sydney for birds of the weight which these capons would necessarily become at the age mentioned, and it is more than doubtful if a corresponding price per pound could be obtained for birds of such weight, as is obtainable for cockerels of 4½ to 6 months old, weighing 4½ lb. to 6 lb. (live weight). The last-named is the class of table fowl that is always greatest in demand in Sydney, and which command, proportionately, the highest prices. This class of cockerel is not cheap at any time, and there is scarcely ever sufficient to meet the demands of buyers even at such prices as from 6s 6d. to 8s. 6d. per pair, and they generally command a shilling higher than the latter price during the months from May to December.

The Department is aware that for two or three weeks previous to the middle of last December there was a plethora of half-grown and low quality strains sent to market, not because they were desirable table fowls, but with the object of making room for growing pullets. As a result, low prices were obtained for this class of bird. This has caused the "bogey" of over-production to be raised in some quarters; but there is no over-production, nor is there likely to be, of prime table poultry of the kinds indicated, which call for no special effort or preparation beyond keeping to the age and development required. A much larger number of this type of bird can be absorbed by the Sydney market than is offering, but the trouble is that breeders have been led to believe that it does not pay to rear the cockerels. This is an entirely erroneous impression, as, on the contrary, it will pay very well to keep them until they are 5½ months old. The moral to be learned from this is, keep the cockerels until they are of the age and weight indicated, but in no case keep them after they get more than a mere bud of spur, otherwise they will deteriorate in value.

When our market becomes fully supplied with the types of birds now in demand, and prices recede in consequence, then caponising will be resorted to as a general practice, to tide over the cheap season. But that time has not yet arrived, and, it is considered, is very far distant, as the demand for good birds will grow with the supply; at any rate, the Sydney market is certainly scantily supplied with such for at least nine months of the year.

The main point to be borne in mind is that there is absolutely no advantage in caponising unless it is intended to carry cockerels over from 7 months upwards. However, this operation will form part of the demonstrations which will be held at the Hawkesbury Agricultural College when the new organisation is complete.—J. HADLINGTON.

A Descriptive Catalogue of the Scale Insects ("Coccidae") of Australia.

WALTER W. FROGGATT, F.L.S., Government Entomologist.

No family of the insect world has received more attention from economic entomologists during the last twenty years than the Coccidæ, because no group is more in evidence in the orchard, garden, and forest. The loss both in quantity and quality of fruit due to the presence of scale insects runs into many thousands of pounds annually in New South Wales alone. Though little or no work has been done in the different natural history museums, the official entomologists have been busy in the economic museums attached to the Departments of Agriculture in making collections of Coccidæ all over the world. In the Bureau of Entomology at Washington, the Federal entomologists have an enormous collection of Coccidæ, with several entomologists constantly making up the new material. There are many smaller collections in the United States, while the collections of Professor Marchel, in Paris, Mr. R. Newstead, in Liverpool, and Mr. Green, of Ceylon, are also well known to all workers at this family.

Australia has been well to the front in the economic study of scale insects, chiefly due to the steady and continuous work of my valued correspondent, the late W. M. Maskell, of Wellington, New Zealand, who has scientifically described a very large proportion of the known species of Australian Coccids. The valuable collection which he left behind him has been recently loaned by the New Zealand authorities to the Bureau of Entomology at Washington, where it is being studied in conjunction with their own collections. It is now seventeen years since Maskell issued his "Synoptical list of Coccidæ reported from Australasia and the Pacific Islands up to December, 1894" (*Transactions of the New Zealand Institute*). To this list he added a number of new species in his papers published between 1894 and 1898. Other species have also been described in Fuller's paper on the Coccidæ of Western Australia in the *Transactions of the Entomological Society of London*, 1897, while Green has described others in various journals.

Though a small number of scale insects had been described by the earliest writers on entomology, most of them were simply recorded in a few lines and placed in the all-embracing genus Coccus. The birth of the study of this family may be said to have started with Dr. Signoret's *Essai sur les Cochenilles ou Gallinsectes*, the first part of which appeared in the *Annals de la Sociétié Entomologique de France*, 1868 The year 1869 was, however, one of the most memorable in the classification, for in the third part of his *Essai* he gave a general indication of the genera, into which he divided his species, with very brief characters, but fortunately accompanied by plates of

figures defining them. In the same year the Italian naturalist, Prof. Targioni-Tozzetti, published a synonymic catalogue of the genera and species he considered valid, in which he described the general structure and natural history of the Coccidæ and divided them into four great subdivisions. This appeared in the *Atti della Societe Italiani di Scienze Naturali*, Milano. Later on in another paper he added a fifth group. Another Italian naturalist who has devoted much study to the structure of scale insects is Dr. Antonio Berlese, who has published (in the *Rivista di Patologia Vegetale*) his "Cocciniglie Italiane viventi sugli Agrumi, 1893-95," forming a bulky volume with many woodcuts and plates of anatomical drawings. Dr. Leonardi's work should also be noticed, and he moreover has dealt with some Australian species.

In the United States there have been many workers on this family; but they have not had much to do with Australian species, except Cockerell, who described some material obtained from Victoria. The American reports upon Coccids were first issued in 1873 from the newly formed Agricultural Experiment Stations, Riley and Le Barron being among some of the first naturalists to turn their attention to Coccidæ from an economic point of view; but Professor Comstock's report for the Federal Department of Agriculture, U.S.A., in 1880, was one of the first official reports upon scale insects.

In 1903 Mrs. Fernald published her great catalogue of the Coccidæ of the World (Bulletin No. 88 of the Massachusetts Agricultural College, Hatch Experiment Station). In this important book the authoress had many difficulties to contend with, and in many cases had to take the authority of doubtful describers and include every species that had been described, but it has placed a list of the literature of the Coccidæ before the workers such as they never had before, and all workers on Coccidæ cannot fail to be grateful to Mrs. Fernald.

One unfortunate point, both in Mrs. Fernald's catalogue and others, is the manner (as far as Australia is concerned) in which localities are given. To investigators in this country, Australia is a very vague locality, and it is time that modern writers remembered that this continent is nearly as big as the United States, and has a climate and flora nearly as varied, and that it is not merely a little island in the Pacific, as a lady in Washington told the writer.

In making out this descriptive catalogue, I have tried to define the exact locality from which each species has been described and the original food plant, particularly when the scale is a native of Australia. A close description has been given of the outward appearance of the scales or puparium of both sexes of the Coccid in order that the ordinary naturalist, who is not necessarily a specialist in Coccidæ, can get some idea of the specimens he finds. The anatomical descriptions of the insects themselves would have made the catalogue too bulky for the general worker on Economic Entomology, and therefore it has been abridged or condensed in this catalogue, but specialists can look them up in the original descriptions. The generic and specific names of

all the cosmopolitan and other species with which we have become familiar during the last twenty years have been retained, and, while the question of priority is very important, it has been strained to the breaking point by Mrs. Fernald following Cockerell's wholesale slaughter of well-established genera on often very doubtful grounds. I have, therefore, followed Messrs. Green and Newstead in their classification.

Judging from the study of the types of some of the American describers of Coccids as given in a Bulletin of the United States Bureau of Entomology, by Sanders, it appears to be rather premature to define some of the genera, when the authors themselves place the same species in different genera, and redescribe their own species under two or three distinct specific names. Included in this list are a number of new species, many of which were originally sent to Mr. E. E. Green, of Ceylon, for identification, who, after holding them for some years, informs me that he cannot undertake their description, and advised me to perform that duty myself. This must be done, but I am indebted to him for determining them for me, and have in most cases used his manuscript names furnished to me from time to time. They are all species that have been found upon native shrubs and plants in the Western scrubs and forests, chiefly collected by myself; there are no introduced species among them. Some of these are also being described in the *Proceedings of the Linnean Society of New South Wales.*

Sub Order Homoptera.

FAMILY *Coccidæ.*

This important division of the *Homoptera* contains a number of insects that come very naturally together under the popular names of Coccids, scales, lac insects, and mealy bugs. They are all furnished with a sucking mouth, consisting of fine setæ enclosed in a sheath or rostrum, which, however, is wanting in the adult males. The young larvæ of both sexes in each species are identical in structure at birth, but as they reach the adult state through a series of moults, the male undergoes a perfect metamorphosis, appearing a perfect two-winged insect, with perfect eyes, ocelli, antennæ, legs, and well-defined head, thorax, and abdomen, perfect in all particulars, with the exception of a few obscure species in which wingless males have been discovered, and the fact that it has no mouth.

The female in most cases either loses all the larval appendages, or they become aborted and rudimentary, and in her final development is simply an egg sac incapable of movement, and withering up into a dry skin when the eggs are deposited or the living larvæ are born.

The chief generic and specific characters of the adult females consist of the number of joints in the aborted antennæ, and the form and structure of the anal segments of the abdomen. They all feed upon the sap or juice of plants.

The Coccidæ have been grouped by different writers in more or less well defined sub-families, which need not be dealt with here, but are placed in order at the head of each division

SUB-FAMILY I, *Diaspinæ*.

This division of the Coccidæ contains the species that are popularly defined as armoured scales, where the larvæ form a scale which is distinct from the coccid, and forms a shield or protective covering under which the insect, after it casts its larval skin, feeds and remains fixed to the leaf or bark upon which it has taken up its position. The larval skin or skins, as many of them moult twice, become the central point or nucleus round which the secretionary matter (discharged by the maturing insects) is built up, and sometimes forms the principal part of the scale. These cast larval skins, often one above the other, may form a regular point or nipple in the centre of the scale, or they may form a basal projection, with the regular scale spreading out to a rounded apex. These cast larval skins are called the exuviæ or pellicles by authors describing Coccids.

In most cases the male and female scales are somewhat similar in form and structure, only those of the males are smaller than the females and more elongated or slender. As the delicate two-winged male coccid has to make its exit from beneath the scale when it reaches the perfect state, the apical portion of the scales are hinged so that the insect can crawl out. On the other hand, the female scale, laying her eggs beneath the shelter of the large scale, simply shrivels up, so that it is much more securely attached to the host plant. The microscopic larvæ crawl from beneath and spread all over the twigs, fruit, and foliage. The dry, now abandoned scale, and the dried remains of the mother, gradually become detached in the course of time and fall off the food plant

The tough texture of the protective scale, and the enormous number of eggs or larvæ produced by each matured female coccid, make this group of the scale insects one of the more difficult to destroy, while they are also less subject to external or internal parasites. The larvæ are active little creatures with well developed legs, antennæ, eyes, and rostra or beaks, with which they puncture the plant and suck up the sap of the tree or plant. Their more or less flattened circular or oval bodies are fringed with fine filaments. At this early stage of their life they are very easily spread from orchard to orchard and garden to garden by the wind, on fallen leaves, on the legs and feathers of birds, or even by other insects that may happen to rest upon the infested trees, and then fly further afield

Most of the typical genera are represented in Australia, either by indigenous species infesting native plants and shrubs, or by cosmopolitan scale insects that were introduced, in many cases, at a very early date in the history of our orchards. These are among the worst scale insects to treat effectively with washes and spray compounds, but in fumigation with hydrocyanic acid gas we have a most effective method of cleaning all infested trees of armoured scale insects.

In placing the genera, I have followed Messrs. Green and Newstead in the arrangement of the groups

The following genera are represented in Australia:—I *Aspidiotus*, II *Aonidia*, III *Parlatoria*, IV *Gymnaspis*, V *Mytilaspis*, VI *Ischnaspis*, VII *Poliaspis*, VIII *Leucaspis*, IX *Diaspis*, X *Fiorinia*, XI *Chionaspis*, and XII *Maskellia*.

Genus *Aspidiotus*, Bouché.

Naturgeschichte des Insekten, 1833, p. 52.
Comstock, *Report U.S. Dep. Agriculture*, 1880, p. 292.
Green, *Coccidæ of Ceylon*, pt. 1, p. 39. 1896.
Newstead, *Monograph British Coccidæ*, vol. 1, p. 80. 1901.

This genus is one of the most important groups of the Coccidæ, both in point of number of species, and the many serious orchard and forest pests found in its ranks; in spite of the many subdivisions, about eighty well known species are listed, and while Australia has many introduced species, it also has a number of indigenous forms adapted to our peculiar vegetation.

The members of this genus are often as cosmopolitan in their range as their food plants, but others are local, and more or less restricted in their host plants. They are popularly known as "Round Scales" on account of the circular form of the female puparium, and may be convex with a regular nipple (pellicle) in the centre, or almost flat and limpet-like, while the pellicles are superimposed, and usually situated in the centre of the secretionary portion. They may be thick and opaque, or thin and almost transparent. Green points out that in this genus, "the first larval pellicle consists of the dorsal parts of the larval skin only, the ventral portion, or lower half with the antennæ and limbs being completely separated, and incorporated into the ventral scale of the puparium." While the male scale resembles the female in structure, it is usually smaller and more oblong.

Professor Berlese and Mr. Cockerell have established several subgenera, and Dr. Leonardi has placed some of Maskell's well-defined Australian species in Signoret's Genus *Targionia*. These I have indicated without removing them from this genus. In the same way I follow Green in not placing a section containing such well-known species as the Red Orange Scale and the Round Scale in the Genus *Chrysomphalus*.

Aspidiotus (*Targionia*) *acaciæ*, Morgan. (Pl. I, fig. 1.)

Entomologists' Monthly Magazine, xxv, p 353, 1889, pl. v, figs. 4–6.
Maskell, *Trans. N. Zealand Institute*, p. 205. 1892.

This species was described from Tasmania upon the Golden Wattle (*Acacia pycnantha*). Markell records it from Whitton, N.S.W., on *Eucalyptus sp.* I have had specimens from Perth, W.A., on *Eucalyptus sp.*

The adult female scales closely encrust the bark of the branchlets of the trees, and are of a uniform chocolate-brown tint, with the pellicle forming a large, bright, reddish-yellow centre, the whole outer surface clouded with a dull bloom, giving them a distinctly greyish tint. Morgan says: "Female scale circular, convex; exuviæ, in the centre of a rather waxy nature, about 1 mm. diameter. Scale, the colour of the bark, with larval skin orange-yellow." Maskell has described a variety also upon an Acacia from Mount Victoria, N.S.W., and others upon *Hakea saligna*, taken near Gosford. He

says: "An insect very near to *Aspidiotus acaciæ*, differing only in the deeper red colour of the pellicles, and in the fact that the puparium is almost always very brittle, falling off in the centre, and leaving only a ring with the pellicles exposed."

I have specimens of this latter variety upon the same species of *Hakea*, and from the same locality, which have been examined by Mr. Green, who says it is a new species of *Aonidia*, and am therefore describing it in that genus.

1325. *Targionia acaciæ*. Cat. Coccidæ, p. 295.

Aspidiotus alatus, n.sp. (Pl. I, fig 2.)

Not uncommon upon the twigs, leaves, and branchlets of Eucalyptus at Dubbo and Wagga, N.S.W. C. French, junior, sent it to me upon *Eucalyptus rostrata*, on the Murray River, near Swan Hill, Victoria.

Adult female puparium, with a very distinctive form, about $\frac{1}{8}$ inch diameter, hardly circular, rising up into a rounded dome, curving round like a mussel-shell. The general colour, light chocolate brown, clothed with a thin, grey shell, giving it a regular ringed structure; pellicle, central blue-black, surrounded with a regular boss, making it very prominent. Adult female, pale yellow, apical segments much darker, irregularly rounded, longer than broad, convex, pygidium deeply striated or ribbed to the apex, produced into a distinct lobe, with a flange on either side.

Aspidiotus aurantii, Maskell.

Trans. N. Zealand Institute, vol. xi, p. 199. 1878.
Comstock, *Report U.S.A. Dep. Agriculture*, 1880, p 293.
A. coccineus, Gennadius, *Ann. Soc. Ent. France* (6), vol i, p. 189 1881.
A. citri, Comstock, *Canadian Entomologist*, vol. xiii, p. 8. 1881.

This is the well-known "Red Scale" of the orange in Australia and California, and is found upon most members of the Citrus family in different parts of the world. It is one of those cosmopolitan species the exact home of which will always be a matter of doubt. Probably it is a native of the East, though described from oranges imported from Australia into New Zealand. Besides the orange, this scale often spreads on to other trees and shrubs, and in Australia does serious damage to roses, mulberry trees, and willows. Not only is it easily introduced into an orchard with nursery stock, but the larvæ can be carried by insects, birds, blown leaves, and infested fruit. Pumpkins left under infested trees often become thickly covered with scales constructed by the wandering larvæ. The circular dull red scale of the adult female, intensified by the colour of the insect beneath, is too well known to need any description, but the action of this scale in neglected orchards is very severe upon the foliage and young branchlets, which often die right back, while the fruit, when thickly infested, becomes spotted, small, and of inferior condition.

A pale-coloured variety, common in the citrus orchards of California, has been described as a distinct species under the name of *Aspidiotus citrinus* (Cockrell, *Bull. 25, Div. Entomology, U.S.A.*, 1891), and is popularly known

as the "Yellow Scale." Marlatt says: "A rather well-marked variety, which is known as the Yellow Scale. This variety does not differ in any structural feature from the Red Scale, but the mature insect does not turn to a reddish-brown; it remains yellowish in colour, and showing through the scale, gives it the colour noted in the common name. This variety, curiously enough, is attacked by quite a number of parasitic flies which keep it more or less in check, so that it is not as a rule so abundant as the red variety.'

1295. *Chrysomphalus auranti.* Cat. Coccidæ, p. 287.

Aspidiotus bossieœ, Maskell.

Trans. New Zealand Institute, vol. xxiv, p. 10. 1901.

Described from specimens from Victoria upon a native plant, *Bossiœa procumbens.*

Maskell says: "Female puparium circular, convex, colour varying from dirty white to yellow, and sometimes to dark brown; texture soft and woolly looking; pellicle central, very small and inconspicuous, yellow. Diameter of puparium about $\frac{1}{16}$ inch. Adult female usual turbinate form, dark brown. Abdomen ending in two medium-sized rounded lobes, with a smaller one on either side, margin serrate. No spinnerets. Male puparium more elongate, smaller, whitish, not carinated.

1203. *Aspidiotus bossieœ.* Cat. Coccidæ, p. 253.

Aspidiotus caldesii, Targioni Tozzetti.

Catalogue, 1869, p. 43.

Signoret, *Ann. Soc. Pont., France* (4), vol. ix, p. 116. 1869.

Cockerell, *Bull. No. 6, Tech. Series, U.S. Dep. Agr.*, p. 18. 1897.

A European species found upon *Daphne collina*, Italy. Fuller has recorded it, on Maskell's determination, from Geraldton (Western Australia) upon an Acacia (probably introduced from Europe).

Cockerell defines this species in his list, "Female scale thin, circular, pellucid, white; exuviæ central; medium lobes very large; grouped glands wanting. Male scale elliptical."

1205. *Aspidiotus caldesii.* Cat. Coccidæ, p. 254.

Aspidiotus camelliæ, Boisduval.

Signoret, *Ann. Soc. Ent., France* (4), vol. ix, p. 117. 1869.

Maskell, *Trans. New Zealand Institute*, vol. xi, p. 200, 1878; p. 21, 1884; p. 41. 1887.

Kermes camelliæ, Ent. Hort., p. 334. 1867.

A. convescus and *A. rapax*, Comstock. *Report U.S. Dep. Agriculture*, 1880, pp. 285, 307.

This is a cosmopolitan species orginally described from Europe on the Camellia, and is found on many different trees and shrubs. In Australia it occurs upon *Acacia longifolia, A. juniperina,* and other species in the bush; in the gardens upon Camellia, Holly, and Furze; and in the orchard it has several times been found on apple-trees.

This is the species that is so well known under the name of the Camellia Scale, and is, I think, without any doubt the species that Boisduval named

Kermes camelliæ, which was followed by Signoret only two years later. Comstock in the same paper in 1881 described it under two distinct names—*A. convescus* and *A. rapax*—and though it has been described, like most cosmopolitan species, under a number of different names, the American writers have called it the Greedy Scale, *Aspidiotus rapax*. For the synonomy, recorded localities, and food plants, I refer my readers to Mrs. Fernald's catalogue.

The female puparium limpet shape, irregular in form, with the apical portion enlarged or curved, so that the pellicles do not appear to be central; general colour variable on different food plants; upon Acacias, thickly massed upon the bark, they have a pale chocolate or reddish tint; Newstead calls them dull yellow, ochreous, or straw colours on hot-house plants; Comstock, grey, somewhat transparent, with a yellow tint when covering the live female. Specimens upon a furze bush near Sydney were more white than grey, and those upon apple trees are usually light coloured. The pellicle dark brown to almost black, forming a central dot surrounded with a well defined ring, and the convex shape of the whole scale very characteristic.

The female "has one pair of lobes, branched plates, no groups of ventral glands."

1261. *Aspidiotus rapax.* Cat. Coccidæ, p. 277.

Aspidiotus (Targionia) casuarinæ, Maskell.

Trans. New Zealand Institute, vol. xxvi, pl. iii, figs. 1–3. 1893.

An Australian species found upon native trees, originally described upon a sheoak (*Casuarina equisetifolia*) from near Albury, New South Wales. I have also specimens determined by Maskell on a ti-tree (*Melaleuca nodosa*) from near Bankstown, Sydney.

Maskell says: "Female puparium dark yellowish brown, circular, rather convex; pellicles yellow; diameter, $\frac{1}{25}$ inch. Male puparium about the same size, elongated, subcylindrical, slightly convex, not carinated. As the extremity is open it appears to be formed of two plates, between which the male rests."

Adult female yellow, rather elongated, with six narrow lobes with rounded extremities, no spinnerets but rows of large single orifices on the abdominal segments; near the rostrum two small groups of spinnerets.

1328. *Targionia casuarinæ.* Cat. Coccidæ, p. 296.

Aspidiotus ceratus, Maskell.

Trans. New Zealand Institute, vol. xxvii, p. 39, pl. 1, fig. 1. 1894.

An Australian species upon the foliage of *Acacia stenophylla* growing on banks of the River Murray, South Australia.

Female puparium snowy white, circular, convex; diameter, $\frac{1}{22}$ inch when separate, but numbers of puparia are usually so massed together that measurement is difficult. Texture solid and waxy; the two pellicles are central, and of a faint yellow tinge, covered by a scale of white wax.

Adult female orange, turbinate, with abdomen ending in two rounded lobes, margin serrate with short spines; no spinnerets.

1207. *Aspidiotus ceratus.* Cat. Coccidæ, p. 254.

Aspidiotus (*Targionia*) *chenopodii*, Marlatt

Tech. Series, No. 16, *U.S. Bureau Entomology*, 1908, Pt. ii, p. 24.

The saltbush scale specimens abundant on the saltbush (*Chenopodium sp.*), Coolabah, New South Wales.

The female puparium is subcircular, convex Colour, light buff; the upper pellicle covered with a white secretion, the second pellicle light orange yellow when exposed

The female nearly circular, with a single pair of lobes, brown, chitonised; lobes oblique at tip; anal opening large; dorsal pores minute.

Aspidiotus cingulatus, Green. (Pl. I, fig. 4.)

This very fine species was obtained by Mr. C. French, junior, at Lake Albacutya, Victoria, upon the branchlets of a sheoak (*Casuarina sp.*) and named by Mr. Green, but I am not sure if he has described it, or simply sent an MS. name. The adult female scales are scattered over the branchlets and are often broader at the base than the diameter of the branchlet, so that they almost curve round it. General colour, dark biscuit brown, with the apex often covered with a rounded cap of white secretion, completely hiding the large flattened rounded brown and yellow pellicle; broadly rounded at the base, very conical, with the apical portion often curving over. Diameter $\frac{1}{12}$ inch.

Adult female dull yellow, broad, elongated, and deeply constricted in the centre on either side. Abdomen blunt at apex, pygidium with tip terminating in four short, broad, truncate tubercules, broadly separated at base. Anal aperture small, narrow.

Aspidiotus (*Chrysomphalus*) *cladii*, Maskell.

Trans. New Zealand Institute, vol xxiii, p. 3, pl. 1, figs. 1–4, 1890; and vol. xxvi, p. 67, 1893.

The range of this species is somewhat remarkable, as it is common in Australia upon sedges and allied plants. I have it from around Sydney on *Xerotes*, on *Cladium* from Victoria, and *Leptospermum* from South Australia. It is also found upon the Aloe in Natal, and recorded from Mauritius.

The leaves of the sedges are often thickly encrusted with the adult female scales, and are very easily detached.

The puparium varies from bright yellow to dark brown, and is sometimes almost blood-red, is circular in form, convex, and about $\frac{1}{10}$ in. in diameter; the outer edges often light-coloured. The pellicles, often rising like a little boss in the centre, are bright orange-yellow. Though the pellicles are not always in the centre like the typical *Aspidiotus*, the male scales are smooth and not carinated.

Adult female dark brown, abdomen terminating in four small lobes, with another pair higher up; the margin serrate, with two rather long hairs on each side.

1209. *Chrysomphalus cladii*. Cat. Coccidæ, p. 289.

Aspidiotus comperei, Marlatt.

Tech. Series No. 16, *U.S Bureau Entomology*, 1908, pt. 11, p. 12.

This species was obtained at Raventhorpe, West Australia, upon a needlewood (*Hakea* sp.), and another undetermined plant in the same locality. Adult female puparium strongly convex, nearly circular, covered with a greyish secretion, usually covering the lemon-yellow or brown-coloured pellicles, but this secretion scales off very easily.

Marlatt says: "This species, in scale characteristics and large anal orifice, remind one of Signoret's *Aspidiotus camelliæ*; in its pygidial characters it is more like *Aspidiotus destructor*, but differs in general details from both these species." The scales are often thickly massed together on the smaller twigs.

Aspidiotus confusus, n.sp. (Pl. I, fig. 3.)

This distinctive species was found completely covering the bark of part of the trunk and main branches of a White Gum (*Eucalyptus sp.*) at Narara, New South Wales. I am indebted to Mr. Green for its determination.

Diameter of adult female puparium $\frac{1}{25}$ in., circular, convex, of a dull grey tint, the pellicles forming a distinct yellow nipple in the centre, but the pellicles are usually covered with the grey secretion, so that they appear as a simple white dot in the centre.

Adult female yellowish-brown, turbinate, with the pygidium very finely marked with parallel striæ, and terminating at the extremity in two large rounded lobes separated from each other with a deep cleft, with a similar smaller lobe separated in the same manner on each side, followed by a serrate depression and a smaller point on the side. Rows of pores running up on both sides of the abdominal segments from the tip of the body.

Aspidiotus (Targonia) coralinus, n.sp. (Pl. I, fig. 5.)

This handsome scale insect covered the young foliage and branchlets of a scrub tree (*Eremophila Sturtii*), and was collected near Bourke, Darling River, New South Wales. Female puparium pure white, conical, circular, not more than $\frac{1}{40}$ in. in diameter, with the apex truncate, forming a ring with a depression in the centre above the dull yellow pellicles. These scales are often clustered together in little patches, and by their presence cause all the foliage to become very sticky.

Adult female yellow, broadly turbinate, abdomen well developed; pygidium coming to a blunt point forming a broad terminal lobe, with four dark parallel ribs forming distinct pointed spines reaching to, but not beyond, the edge of the pygidium; a slender spine projecting in the centre, in a line with the large parallel ridges, divides the anal lobe, with several fine hairs projecting on either side. A distinct prominent arcuate flange on either side, with a spine at the bottom of the cleft, and a patch of fine spines on either side; anal aperture large.

(*To be continued.*)

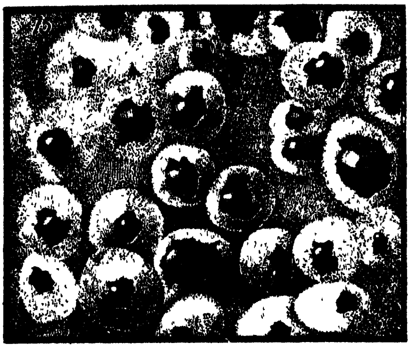


Fig. 1.

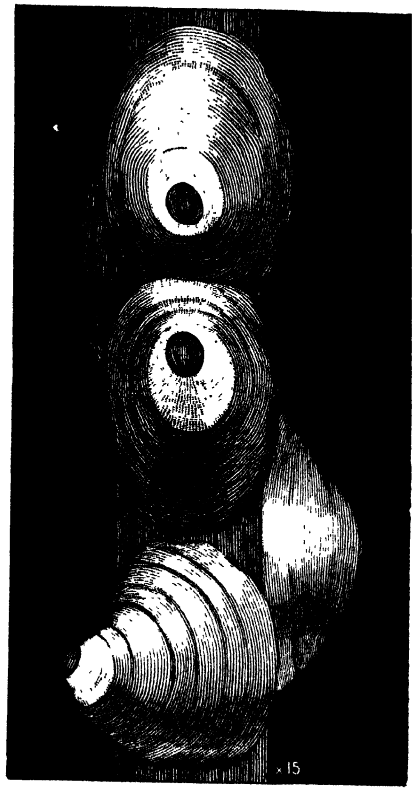


Fig. 4

Fig. 2.

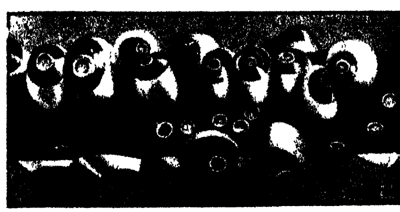


Fig. 5.

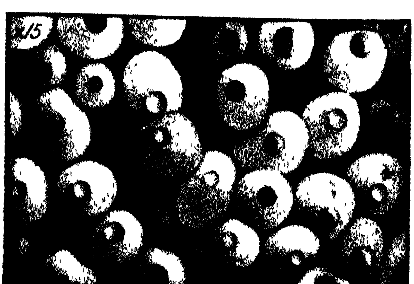


Fig. 3.

SCALE INSECTS OF AUSTRALIA.

Plate I.

1. *Aspidiotus acaciæ*, Morgan.
2. ,, *alatus*, n.sp.
3. ,, *confusus*, n sp
4. ,, *cingulatus*, Green.
5. ,, (*Targiona*) *corallinus*, n sp

The Prickly Pears of Interest to Australians.

J. H. MAIDEN,
Government Botanist of New South Wales, and Director of the Botanic Gardens, Sydney.

No. 10.—The Golden-bristled Prickly Pear (*Opuntia microdasys*, Lehm.).

I FIRST recorded this as acclimatised in Australia in May, 1910, having then received specimens from Mr. George Valder, then Chief Inspector of the Department of Agriculture, who found a clump of it, 9 or 10 feet in diameter, in the Pilliga Scrub, New South Wales.

Description.—The following excellent account of it is from the pens of Griffiths and Hare, Bulletin No. 60, New Mexico (U.S.A.), Agricultural Station, p. 78.

A low, prostrate or ascending plant, 2 feet or less high; joints in proportion of 4 by 5 inches, which is a common size, obovate, conspicuously pubescent, areoles circular, ¼ to ⅜ inch apart; spicules yellow, prominent, spreading, forming a cap-like bunch ¼ inch in diameter, and developing anew from lower part of areole for at least three years, old joints often appearing with old, grey, dirty spicules above and bright, new, yellow ones below; spines entirely absent; flowers yellow with white or greenish filaments and style and bright dark green 6 to 8 parted stigma fruit small, subglobose or obovate, usually less than 1 inch long, with thin rind, green, with a blush of purple on outside, but the interior greenish throughout, formidably protected by closely set areoles filled with yellow spicules.

This is one of the most common of the cultivated prickly pears of both garden and conservatory on account of the attractive appearance of its conspicuous bunches of spicules, its hardiness and ease of propagation. Its small size, as well as its numerous small spicules, render it highly improbable that it will ever amount to anything as a stock food. Some forms have brown spicules and are found in some collections under the name of *O. rufida*, but the latter is a very different plant.

No. 6,525, collected at Alonzo, Mexico, 10th June, 1904, sample represented by formula 7–2–1 + 17 small green fruits from three plants.

No. 7,640 collected from same plants as No. 6,525, 14th March, 1905, sample represented by formula, 1–1–1.

CHEMICAL ANALYSES.

	Green.			
Sample No.	6,525	7,640	6,525	7,640
Water	84·58	88·12	6·47	2·80
Ash	3·57	2·18	21·65	17·88
Crude Protein	0·72	0·40	4·38	4·05
Crude Fat...	0·31	0·20	1·90	1·6
Nitrogen Free Extract	7·53	7·51	45·65	61·42
Crude Fibre	3·29	1·50	19·95	12·24
Organic Matter	11·85	9·70	71·88	79·32

Very shortly after it was described as *O. microdasys*, it was described as *O. pulvinata*, as follows:—

O. pulvinata (DC. Mem. Cact. in Mem. Mus. 17, p. 119), joints oval, erect, velvety, areolæ convex, pulvinate, the whole occupied by innumerable straight, crowded, yellow, fragile bristles, without any true prickles intermixed. Native of Mexico, Coulter. A very distinct species. *O. microdasys*, Lehm., hort. Hamb. ex Salm-Dyck in litt. Pulvinate Indian Fig Shrub. (*Gen. Hist. Dichlam. Plants*, Don. iii, 172.)

Habitat.—Mexico (Coahuila).

Occurrence in New South Wales.

This has been already referred to, and it occurs near Cuttabri in the Pilliga Scrub, in the north-western part of this State. The common pear of the district is the Pest Pear (*O. inermis*), considerable areas being thinly covered with it.

The plant is one that is very much cultivated in Europe and America for ornamental purposes, and how it was originally obtained is not clear. It was brought to Cuttabri for indoor cultivation nearly half a century ago by the parents of a lady who is now living, and after their death it was thrown into the bush; there it has spread as stated. It had some local reputation as a fly-catcher, those insects being impaled on the bristles.

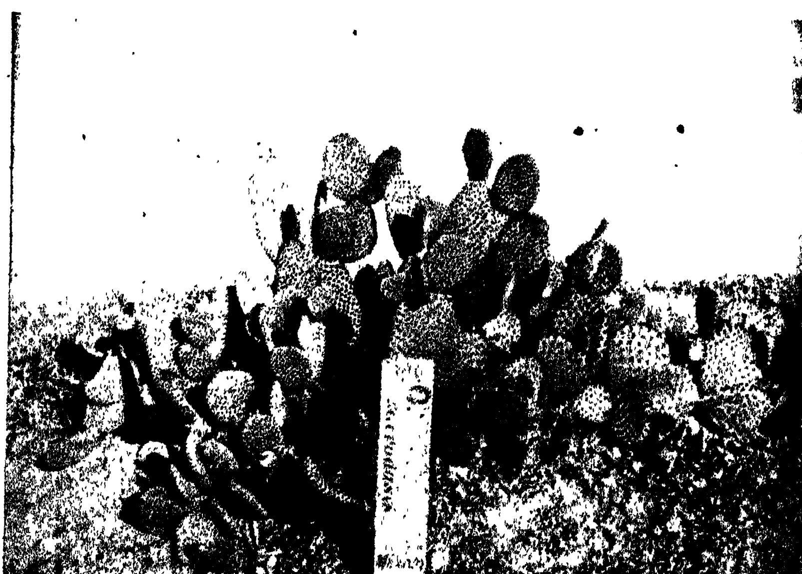
Although so common in cultivation, there was none in the Sydney Botanic Gardens until I introduced a specimen about fifteen years ago. Its profusion of uniform golden bristles gives it a very ornamental appearance, particularly in the sunshine. At the same time, these bristles are so exceedingly abundant, and so irritating, that should this plant display a tendency to spread, it would become a serious pest.

It has no spines, but these weapons are usually not so offensive as the bristles (spinules or glochidia).

It had not fruited in the Sydney Botanic Gardens at the time the plate was drawn, but the fruit has been well described by Messrs. Griffiths and Hare (*supra*). It has since fruited (November, 1913).

DESCRIPTION OF ILLUSTRATION.

Plant in Sydney Botanic Gardens, 3 years old from joint.



Opuntia microdasys. Botanic Gardens, Sydney.

Opuntia (Nopalea) dejecta. **Botanic Gardens, Sydney (see *Agricultural Gazette*, page 973, November 1913).**

The Clydesdale and the Shire.

Some Points of Differentiation.

Compiled by the Veterinary Officers of the Stock Branch, under the direction of S. T. D. SYMONS, M.R.C.V.S., Chief Veterinary Officer

In view of the many inquiries that have been made with regard to the actual points of difference between the Clydesdale and the Shire, the following has been compiled as a guide:—

Clydesdale.

Colour.—Bay or brown, dark shades of either preferred, dappled, sometimes black or grey. Chestnut and roan not in favour.

Height.—Mares, 16 hands.
Horses, 16 2 hands.
Few exceed 17 hands.

Girth.—7 feet 6 inches to 8 feet is desirable.

Temper.—Mild, but still possessed of plenty of nervous energy and muscular vigour.

Head.—Medium size.

Face.—Profile straight or slightly arched, but not dished; if dished often accompanied by small ears and what in the main is characterised as a pony head, and means a strain of Old Highland or Galloway blood.

Muzzle.—Not too refined or tapering.

Nostrils.—Wide and open.

Eye.—Bright, dark, full and vigorous, yet mild.

Forehead.—Full between the eyes, broad, and gradually taper upwards in direction of the ears.

Jaw.—Broad, but not too large or loaded with flesh.

Ears.—Good length, with frequent motion indicating a good disposition. Not hanging, showing sluggishness, nor "prick-eared."

Neck.—Medium length, massive, slightly arched in male, also in female when she is old or in high condition; ewe-neck barred.

Shoulder.—Closely knit at the top, and oblique. The humerus should form an obtuse angle with the scapula, otherwise the animal cannot put its leg forward when moving, and practice the long, quick step for which the breed is renowned.

Back.—Straight, broad, and not too long.

Ribs.—Well sprung round, the last one being of good length.

Forearms.—Well muscled.

Knee Joints.—Flat, broad, clean in outline, close to the ground, and not over large.

Cannons.—Flat, short, of good quality, free from any excess of soft tissues between them and the skin.

Pasterns.—Long, oblique, to suit formation of his shoulder, to counteract the concussion of his quick, firm step.

Coronets.—Open are favoured, but some people consider the breed is too open here. However, so long as the hoof is deep, and open at the heels, it indicates a good useful wearing hoof.

Feet.—Must be of good size, correct in shape, strong, and absolutely sound.

Back.—Straight, broad, and not too long: a slight droop is perceptible in the back in some of the best horses of the breed, and is not to be regarded as a disqualification, or even as a serious fault.

Thighs.—Muscular, well developed, and broad; gaskins also.

Hocks.—Nicely angled, and free from any suspicion of straightness, not over large, and well let down.

Feathering.—Of a pily nature, flowing, silky, neither too deficient nor too abundant, nor spreading round in front.

Weight.—Mares, 1,400-1,600 lb.
Entires, 1,600-2,000 lb.

Measurements of well-known Sires.

Sir Everard.

Height	17 hands 1 inch.
Weight	$20\frac{3}{4}$ cwt.
Bone below knee	11 inches.
Girth	8 feet.
Arm	26 inches upper muscles.
Knee	17 inches round.
Bone below hock	12 inches.
Centre of knee to centre of fetlock	$11\frac{1}{2}$ inches.
Stifle to bend of hock	$21\frac{1}{2}$ inches.
Point of hock to fetlock	$18\frac{1}{2}$ inches.

Prince of Albion.

Height	16 hands 3 inches.
Girth (in low condition)	7 feet 4 inches.
Weight	not given.
Arm	$23\frac{1}{2}$ inches.
Below knee	$11\frac{1}{2}$ inches.
Below hock	$12\frac{1}{2}$ inches.
Length of elbow to knee (mid.)	$19\frac{1}{2}$ inches.
Length, centre of knee to centre of fetlock	$11\frac{1}{4}$ inches.
Stifle to bend of hock	$21\frac{1}{4}$ inches.
Point of hock to fetlock	$14\frac{1}{2}$ inches.

Sirdar.

Height	17 hands $1\frac{1}{4}$ inch.
Girth (in low condition)	7 feet 10 inches.
Weight	$19\frac{1}{2}$ cwt.
Arm	23 inches.
Below knee	$10\frac{3}{4}$ inches.
Below hock	$12\frac{1}{4}$ inches.

Length of elbow to knee	$18\frac{1}{2}$	inches.
Length, centre of knee to centre of fetlock ..	$12\frac{1}{2}$	inches.
Stifle to bend of hock	22	inches.
Point of hock to fetlock	$15\frac{1}{2}$	inches.

General Considerations.

He should carry his feet absolutely straight and level. So-called wide at the shoulder—*i.e.*, having the fore limbs so coming out of the shoulder as to force the animal to walk in front somewhat after the fashion of a bulldog—is unpardonable.

Hard, narrow face and Roman nose more objected to even than the pony head.

Probably during the last three years the most objectionable and undesirable blemish is weakness in the thighs, and not sufficient notice is taken of this defect by judges.

Improvements made in Clydesdales during past twelve years:—

An increase in the quality, *i.e.*, density and wearing property of the bones.

Marked advance in deepening of the rib, shortening the coupling, and rounding the barrel.

A gradual and quite discernible return to the old Clydesdale head.

A very gradual advance in freedom of diseases scheduled as unsound by the Royal College of Veterinary Surgeons.

Shire.

Colour.—Bay, brown, black, grey. First three colours most popular. Grey is the very old Shire horse colour.

Height.—Mares not under 15·3 hands up to 16·1 hands. Entires when full grown go up to 17 hands.

Weight.—Mare, 1,800 lb.; entire, 2,000-2,200 lb.

Head.—Masculine and no trace of ponyness. Long, not too lean, but massive.

Forehead.—Broad, neither too prominent nor too flat.

Eyes.—Bright and fairly prominent.

Nostrils.—Capacious.

Jaws.—Deep and strong, with a liberal distribution of strong hairs over the skin.

Ears.—Long, thin, pointing rather forwards.

Neck.—Of fair length, substantially developed, nicely arched and of good proportions.

Shoulder.—Should slope a little from the withers downward and forward, but not too much so, and well let down into the chest.

Girth.—7 feet 6 inches up to 9 feet.

Ribs.—Well sprung short, flat ribs to be avoided.

Back.—Short and level.

Loins.—Wide and powerful, well ribbed up.

Tail.—Well set up.

Bone in stallions.—Below the knee always 11 to 11½ inches; below the hock, 12½ to 13 inches.

Hips.—Wide, showing great signs of power.

Quarters.—Long, deep, well muscled.

Pastern.—Of sufficient slope to enable the animal to show smoothness of action; long pasterns are weak and to be avoided.

Feet.—Should be wide and open at the heel, with the wall of sufficient depth to avoid any resemblance to flatness of foot.

The Mare.

Great size, or in other words, great height, is not only not an essential, but is usually detrimental.

The typical brood mare should rather be long, low, wide, standing on short legs, with well sprung pasterns, and strong, open feet. The bone should be as wide and massive as can possibly be had.

Feather should be abundant and worn at all seasons.

Depth of both heart and back ribs should be conspicuously present.

The walk should be true level without any symptoms of rolling, and this applies also to the stallion.

Measurements of well-known Sires.

MARK EATON ROYAL HAROLD.

Height	17 hands ½ inch.
Girth	8 feet 1 inch.
Knee	20 inches.
Below knee	13¼ inches.
Round coronet	20¾ inches.
Round hock	23 inches.
Below hock	14 inches.
Across foot	7½ inches.
Length head	30 inches.
Mid-knee to ground	21 inches.

BESCOT HAROLD.

Height	17 hands.
Girth	7 feet 11 inches.
Knee	18½ inches.
Below knee	12½ inches.
Round coronet	20¾ inches.
Round hock	22 inches.
Below hock	13¾ inches.
Across foot	7¾ inches.
Length head	33 inches.
Mid-knee to ground	20¾ inches.

Some Points of Differentiation.

Colour.—Practically the same, although some of our best Shires spring from the old grey strain, "Honest Tom," and are grey, which is not permissible in Clydesdales.

Height.—No differentiation, but a great difference in bulk.

Weight.—The Shire shows a great deal more bulk than the Clydesdale. Comparative weights in mares: Shire, up to 1,800 lb.; Clydesdale, to 1,600 lb.; Shire stallions, up to 2,200 lb.; Clydesdale, up to 1,800 lb. or 1,900 lb.

Girth.—Shire, up to 9 feet; Clydesdale, rarely over 8 feet.

Head.—This should be characteristic, for in the Clydesdale we get the long, clean head, eyes well apart, and broad forehead. In the Shire, the head is inclined to be coarser, broader, and in most cases Roman. The Clydesdale's ear should be fine in comparison with that of the Shire, which is thick and hairy; also in Shires we often have a coarse growth of hair under jaw, and often a moustache.

Neck.—Should in both cases be in proportion to body. The Clydesdale is inclined to be lighter in the crest than the Shire.

Shoulder.—More sloping in Clydesdale than in Shire, to allow of the obliquity of the various bones needed to get the smart elastic walk characteristic of real Clydesdales. A Shire is more massive in the shoulders, and is essentially more of a weight mover than a fast walker.

Knees.—Massive in Shires, and inclined to be a bit beefy. In Clydesdales, if well-bred, clean-cut, and not so massive.

Bone.—Measurements below the knee are in size to the advantage of the Shire, which goes up to 13½ inches, whilst the pure-bred Clydesdale rarely exceeds 11 to 12 inches. This, of course, affects the cannon bones, the Shire showing a large cannon bone, whilst the Clydesdale is much smaller. In all cases bone must be flat and show no beef.

Pastern.—The great characteristic of the Clydesdale is its sloping pasterns, giving it elasticity, but if carried to excess also weakening them. The Shire is more upright, but still should have a proper angle, or we get jarring, and as a result diseases of foot and pastern.

Feet.—Clydesdale is liable to be flat and fleshy, whilst a Shire has a foot like a block.

Back.—In both cases short and well muscled.

Quarters.—Massive and wide in Shire, and showing a large hip bone. Tail very liable to be set low. Clydesdale not so massive and tail set up better.

Thighs.—Extremely powerful in Shire, and here the Clydesdale often falls off.

Hock.—Massive in Shire, not so massive and cleaner cut in the Clydesdale.

Feather (Hair).—In the Clydesdale extends to below knee and hock; in Shire, to above knee and below hock, and generally a tuft on knee and hock, and in the Shire is much more profuse. In the Shire the hair covers a lot of the foot, whilst in the Clydesdale it only extends a little way down the foot.

The above are points found in pure-bred horses, of which there are very few in the State at present. The Clydesdale, Shire, and mongrel are crossed indiscriminately; very often, as a rule, from false economy.

Bumble-foot in Fowls.

Several correspondents have drawn attention to this trouble, and the reply to one of them is therefore given for general information.

Bumble-foot is caused by the fowl running about on hard stony ground, or flying from high perches down on to a hard floor. At the commencement of the trouble a corn forms under the ball of the foot. Eventually this festers and turns into an abscess, with the result that the foot swells between the toes. The fowls so affected should be confined to a house, the floor of which is covered with litter, or if the house is on a grass plot this will serve the purpose equally well.

To remedy the ailment, the foot of each bird should be immersed for about ten minutes in water as hot as can be borne by the hand. If the abscess contains pus, it may be lanced. In doing this, care should be taken not to cut the tendons of the foot, and it will be noted that there will be less risk of this happening if the incision is made the same way as the toes run. Before operating on an affected fowl, a healthy bird should be examined, in order that some idea of the anatomy of the foot may be obtained. After making the cut, it should be bathed with water containing boracic acid, in the proportion of one teaspoonful of the latter to half a pint of the former. The wound should then be dressed by spreading some Venice turpentine on a piece of linen, which should be bound between the fowl's toes right under the foot, and finished off by tying it around the leg just above the foot. The ligature can be left on for three or four days at a time.

It may here be mentioned that it is a very tedious operation to remedy bumble-foot, and then again, after all the trouble taken, probably not more than 50 per cent. of the fowls treated will be cured.

The paleness about the head, which often accompanies the complaint, is caused by the lowered condition of the fowls, consequent upon the pain from the abscess and their inability to get about.—J. Hadlington.

Fixing the Ammonia in Liquid Manure.

At a dairy farm the urine from the cows while in the bail flows down a cement drain and is caught and saved for liquid manure. After a day or two a smell arises if the liquid is not all used. The owner asks what deodoriser would be safe to use so as not to destroy any of the manurial effects of the liquid.

In reply Mr. Guthrie, of the Chemist's Branch, stated that the addition of powered gypsum would deodorise the liquid and fix the ammonia so that the manurial value would not be lost.

Ringbarking in the West.

C. J. WOOLLETT, Stock Inspector, Cobar.

ANY person interested in land settlement cannot but observe the large areas in blocks of 10,000 to 50,000 acres now being made available for lease in the Western Division of the State.

Stock returns show that the carrying capacity of western country is very much lower than it was a few years ago, and as these blocks are being cut up into similar areas as formerly, history will surely repeat itself, notwithstanding lower rents and the increased value of sheep and wool, if methods of management are not improved. Some settlers are making provision for water by tank sinking, and many are improving by ringbarking.

The varying results observed here from ringbarking has led the writer to inquire into the causes of the differences. In some cases it is due to letting large contracts at the one time, the work extending over the greater portion of the year. Where large areas of ringbarking have been under observation here, by far the most satisfactory results have been obtained where the work has been done in the summer. Indeed, in two cases the most unusual circumstance of yarren suckering was observed through ringing being done in a wet winter, and the country is not as good now as it was before the expenditure was incurred.

With a view to ascertaining the views of others, the Pastures Protection Board rolls were obtained from the secretaries of the Cobar, Wilcannia, Bourke, and Hillston districts, and circulars were sent to station managers. Forty-six replies were received. Several stated that they had had no experience, whilst others were very indefinite. However, the writer is indebted to several gentlemen for lengthy replies, containing the results of their experiences, extending over many years.

The first question asked was: What time of the year do you consider the best for ringbarking?

A very general reply was when the sap is up. A practical guide to know when the sap is flowing freely is when the bark strips easily, or when the leaves are of a brighter green than ordinarily. It is a well known fact that trees are dormant in winter, and that the sap is then down. Theoretically then, it would not be advisable to ringbark in winter, when the sap is down. Why? Because the food supply is cut off the tree above the ring, and the stored starch goes to the dormant buds, and they develop into suckers.

The time of year when the sap is flowing freely will depend on the locality, weather, and species of tree.

Nearly all trees are killed after the first ringing, excepting box and gum (also known as Coolabah), which always sucker more or less, depending on the season when the operation is carried out and the method of ringing adopted.

In analysing the replies to the above question a vote has been given to each month where specifically mentioned. Appended is the result:—

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
8	9	9	5	4	2	2	2	2	2	2	8

From this table it will be seen that the warm summer months are mostly favoured. The above are the results of observation by practical men.

The next question was: When do you find the most vigorous suckering, after winter or summer ringing? This question was partly covered by the first. Ten persons were of opinion that suckering was freer after winter than summer ringing, and three votes were recorded *vice versâ*. Two had the proviso, "if followed by heavy rains," when referring to summer ringing.

To the third question: What kind of ringing do you prefer? several replies were received, and these may be summarised thus:—

Timber.	Chip out or Scarf.	Frill
Box and Gum	14	1
All others...	2	8

The disparity between the totals is because some correspondents only referred to box and gum.

It is an almost unanimous opinion that chip ringing is the only satisfactory method for old box and gum, and scarf for trees from 10 to 18 inches in diameter. Frill ringing for these varieties has been abandoned.

Mr. McKellar, of Merri Merrigal, who has 300,000 acres of ringbarked country under his charge, and an experience extending over twenty-five years, describes chip ringing thus:—"The chip ringing I refer to is made by two down chops. The first being the same as in frill ringing, and the second about 2 inches above and allowing the axe-head to fall outwards, which breaks the chip out. My experience here is that you must damage the outer surface of sap wood the whole way round, or you will have trouble with the bark joining across the space."

Mr. Officer, Kergunyah, Cobar, states:—"For full-grown timber I prefer the chip out, but for trees under 9 inches in diameter, a strip of bark 8 inches wide. Timber under 4 inches in diameter I do not ring, as the suckering is too vigorous and, to cut any depth, a great many blow down and grow stronger. These I trim to 7 feet of all limbs, and so improve the country by allowing the sun to penetrate and sweeten the grass."

(Mr. Officer has 40,000 acres of ringbarked country, done over a period of years, and is one of the most successful men in the district.)

Another very general and successful method is to take a strip of bark 9 to 12 inches right round the trunk, removing every vestige of bark, and about 3 feet from the ground. By this method, the tree naturally dies more slowly than when the cut is made into the sap wood, but there is the very great advantage that suckering is slighter.

In connection with dealing with suckers, Mr. Madden, The Rookery, Cobar, states:—"In ringbarking suckers, which are too big to split off with

the axe, it is always an advantage to ring the suckers in preference to the stump underneath them. When the stump is "rung," the sprouts will come out of the ground from the roots, and are very hard to get rid of."

Frill ringing for trees other than box and gum is recommended, and is the practice all over this district, where contracts for over 200,000 acres on different stations have recently been let.

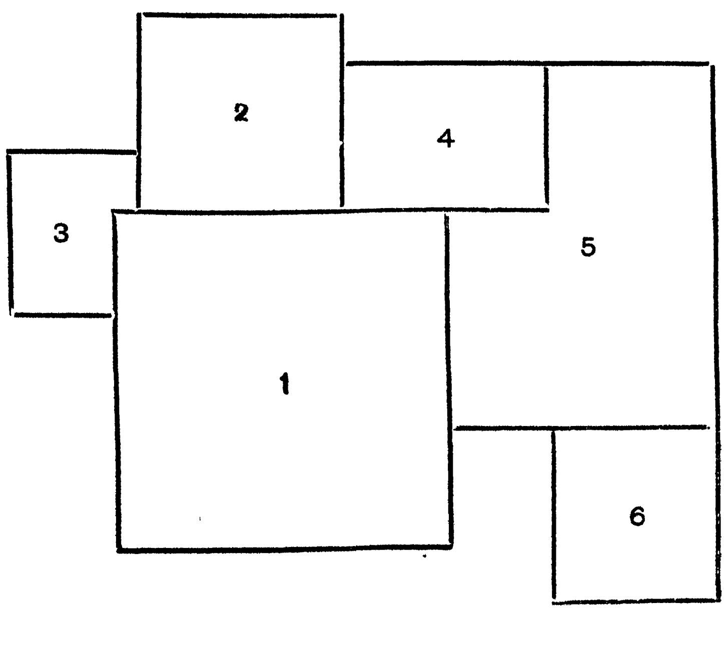
"I feel sure the best method to adopt for belah and pine is frill ringing, *i.e.*, not to take off a strip of bark but to wrench the axe slightly when it enters the tree. This is a cheaper method than chip ringing and is quite as effective. *Re* above timbers, we find feed grows through it four months after treating, though the trees may not die within a year to eighteen months. Odd ones will die almost immediately."—Mr. Parker, Mena Murtie, Wilcannia.

"In ringbarking pine, yarren, &c., such trees as do not sucker, the better plan is the quicker one, such as what is known as frill ringing. Just one chop with the axe round the tree, meeting the cuts in the wood, and then giving the axe a wrench, so as to make sure you miss none between the cuts."—Mr Madden, The Rookery.

Several correspondents refer to the necessity of leaving the timber in the vicinity of tanks for shade and breakwinds.

Results from Ringbarking.

In order to give some concrete example of the benefits derived from ringbarking the writer obtained the stock returns supplied to the Cobar Pastures Protection Board for the last five years, and ascertained the actual carrying capacities of several properties in the district, all more or less contiguous as indicated by the diagrammatic sketch.



The total areas embrace over 860,000 acres, and, as far as appearances go, are much the same as regards quality of soil. The country is red, and the principal timbers are box, gum (*Eucalyptus intertexta,* sometimes called Coolabah), ironwood, pine, yarren, mulga, &c.

As a basis of calculation one head of large stock has been assumed to be equal to six sheep, and each property has carried upwards of 60 head of cattle.

The places are managed by men of long experience in the West, therefore the reader may be assured that the properties have been wisely stocked.

Station.	Total Area	Area Ringbarked.	Sheep actually carried for last five years.	Carrying Capacity.
	acres.	acres.		1 sheep to—
1	240,000	18,000	11,560	12 acres.
2	164,500	... ..	6,693	24 ,,
3	40,960	40,960	5,235	7·8 ,,
4	93,000	10,000	5,730	16 ,,
5	255,585	90,000	29,839	8·5 ,,
6	71,000	40,000	8,379	8·4 ,,

These figures may be stated in a somewhat different way. Assuming the properties to be of equal carrying capacity under similar conditions, and taking one sheep to 24 acres as the standard for virgin land, as based on the capacity of property No. 2, none of which is ringbarked, the value of the ringbarked country ranges from one sheep to 4 acres to one to 7·8 acres, or an average of 1 to 5 over the whole area. In other words, ringbarking has more than quadrupled the carrying capacity of the land. This will be seen from the following summary:—

Station No.	Total Area in Acres	Area Ring barked	Sheep Actually Carried last Five Years	Carrying Capacity one Sheep to	No of Sheep on Unrung Country, at one Sheep to 24 Acres	No. of Sheep on Rung Country.	Carrying Capacity of Rung Country, one Sheep to
				acres.			acres.
3	40,960	40,960	5,235	7 8 or ·13	..	5,235	7·8
1	240,000	18,000	11,560	12 ,, ·08	9,166	2,394	7·5
4	93,000	10,000	5,730	16 ,, ·06	3,460	2,270	4·4
5	255,585	90,000	29,839	8·5 ,, ·11	6,900	22,939	4·
6	71,000	40,000	8,379	8 4 ,, ·12	1,290	7,089	5·6
Totals and Average	700,545	198,960	60,743	11·5 or ·09	20,816	39,927	5 approx.
2	164,500	... .	6,693	24 ,, ·04	....	..	.. ...

Cost.

As to the question of cost, it has been ascertained from managers who have had the work done, and from contractors constantly carrying out the operations, that to "chip out" costs 10d. to 1s. per acre, and to "frill and scarf" 9d. per acre.

Conclusion.

From the experiences referred to, it is obviously desirable to limit, as far as possible, all ringbarking operations to the hotter part of the year, or from December to April. The improved carrying capacity of the country resulting from judicious ringbarking much more than compensates for the expense.

Ostrich Farming in New South Wales.

J. E. CAIRNES, Nardoo, Coonamble.

THE industry, which to-day ranks as one of the greatest in South Africa, has existed only for about fifty to sixty years, and it is only in the last twenty years that any effort has been made there to improve the stock by careful and selective breeding.

About thirty years ago ostriches were imported to Australia from South Africa, and their progeny are now to be found in South Australia, Victoria and New South Wales.

These birds do not seem to have been taken seriously as a money-making industry in this country until the last few years, and then only by one or two men, who have, however, proved conclusively that ostrich farming pays even better than sheep raising.

Had, however, one-tenth of the thought and care expended on sheep breeding been devoted to careful ostrich breeding, it may safely be said that Australia, and particularly the artesian area of New South Wales, would have been a very great rival to South Africa in feather production at the present day.

The soil and climate in at least one part of New South Wales has been proved most suitable to feather production, and the progeny of birds brought over by the writer from South Australia nine years ago are now producing far finer feathers than those of their ancestors. There is plenty of country of similar climate and soil in other parts of this State and Victoria that may prove when tried to be as well, or even better, suited to the growth of feathers.

There are also many men in New South Wales who have thoroughly studied the principles of sheep breeding for a particular standard while improving their flocks, and these are the men who would be most likely to make scientific ostrich breeding a success.

In South Africa it has been found that birds yield far more valuable feathers if grazed wholly, or to a great extent, on lucerne; and it is chiefly this fact that has given a great impetus to irrigation in Cape Colony. As much as £200 per acre has been paid in South Africa for irrigated lucerne land on which to run ostriches. According to authentic information, it is found in South Africa that lucerne will carry from three to five birds to the acre all the year round, and as the average return per grown bird at the present time appears to be from £7 to £10 per annum, we cannot wonder at such high prices.

The common or "veld" birds, run on natural feed in South Africa, bring in from £3 10s. to £4 per annum, while the birds run on natural feed in the Coonamble district of this State return over £5 per annum. Surely, with these facts before us, it is worth paying some attention to selective breeding

of ostriches on lucerne grown under irrigation. Over £20 per plucking is often realised from high-class stud birds in South Africa, while £1,000 has been paid and in some cases refused for a good pair of stud breeders.

When we consider that twenty years ago there were no stud birds, we cannot help wondering at the rapid strides made. There is no reason why we should not do just as well in Australia, as already we have the birds in this country that are known to produce a valuable type of feather. A consignment of feathers sent to the London market by the writer was reported on by the expert to one of the leading firms of feather brokers as comparing very favourably with the South African product.

Soil and Climate.

The first thing to consider in starting an ostrich-farm is the suitability of soil and climate.

The ostrich, to produce the best feathers, requires a dry, crisp climate, such as we have in the central and western divisions of New South Wales, and the western districts of Victoria; but he also needs green, succulent feed. Consequently, climates with a low rainfall, but with water and soil suitable for irrigation, would probably give the best results. Lucerne has been found to be the best fodder, so that the conditions and facilities should be of the best for its growth. In moist, damp climates great difficulties will be met with in rearing chicks.

A rainfall of from 10 to 20 inches in a country that grows herbage well in both summer and winter, with facilities for lucerne growing, would be most suitable for the successful establishment of an ostrich farm.

The word herbage is used in distinction to grass, as herbage such as clover, trefoil, crowfoot, wild carrot, wild parsnip, tar vine, and other summer creeping vines, is much more relished by the birds than grass, which they will only eat when young and green. A certain amount of salt weed is good for them, but feathers grown entirely on saltbush will be harsh and undesirable. Other fodder crops grown by farmers in South Africa for ostriches are field peas, cowpeas, millet, rape, and young barley and wheat crops when about 6 inches high. They also do well on clover burr and other seeds in the dry summer time, but require a certain amount of green picking as well. Cold does not seem to affect them so long as the air is dry.

For breeding camps the soil should be, if possible, of a sandy nature, or sandy loam, in order to reduce the risk of getting the nests flooded in wet weather. The most suitable fences for ostriches are long panel fences with wooden droppers wired on, say three posts to the chain, with three to four droppers between the posts. The height for breeding camps should be about 4 feet 6 inches, though a fence 4 feet to 4 feet 2 inches high is sufficient to hold birds in the larger paddocks. The wire used should not be thinner than No. 8 gauge, though a thicker gauge is even better. Barbed wire should not be used where it is likely to come in contact with the birds.

Selection of Birds.

Ostriches can be obtained both in South Australia and in New South Wales at prices varying from £10 for chicks to £50 for mature males. A good start could be made with, say, three pairs of mature birds over $3\frac{1}{2}$ years old, about ten young birds 1 to 2 years old, and about fifteen chicks. The object of having chicks to start with is to have them ready to mate with the chicks your own breeders will give you.

In selecting birds the main point to look to is the quality of the quill feathers or "whites." These feathers should be broad, with a dense flue and a broad, heavy tip. The quill should not be coarse and stiff, and should be of a round section in preference to a square section. The feathers should be a fair length, say 18 inches to 20 inches when ripe and ready to take.

After the feather, the shape of the bird is the next consideration. As in most other stock, a well proportioned, broad, compact bird is preferable to a tall, thin, long-legged one; a broad bodied bird being better able to cover its eggs than a narrow-bodied one. The head should be flat and wide between the eyes, which should be prominent: the feet large, the thighs and legs powerful.

Some hens give very few pure white feathers, their quill line being nearly all slightly coloured. This is not a disadvantage in a breeder, provided that the quality of the feather is good. Of course, with hens of equal qualities in other respects the white feathered one would be preferred.

The body feathers should be curly, with a good rich shiny colour on them.

The birds, if in good condition, should be broad across the back, with a distinct furrow running down the middle of the back.

The tamer and more domesticated they are the better, but that does not mean that they will not fight you when roused or when nesting. Birds that have always been well handled and looked after are easier to manage, and not so likely to get knocked about when being mustered or brought into the yards for any purpose.

Moving Birds

Ostriches travel well by train in ordinary cattle waggons. For short distances up to one day's journey, about twenty-five birds may be placed in a truck, and for longer journeys about half that number. In the latter case they require feeding about three times a day. These feeds can be conveniently given in troughs made out of wheat bags, one trough being tied across each end of the truck about 3 feet from the floor. Lucerne or any green fodder, chaffed or cut up fairly small, mixed with a little bran just damped, with about $\frac{1}{2}$ lb. of grain per bird, makes a good feed. Chicks when travelling would require feeding oftener, say every two hours. They can do without water as long as they get green, juicy feed. They soon become accustomed to the train, and will camp down at dusk, after the first day, just as if they were in their own paddocks.

Mobs of about ten to 100 birds will travel well by road, doing about 15 miles per day on a long journey of several days. At least one mounted man

should lead the mob, while from two to four mounted men drive the birds after the leader. They should not be pushed along fast, and if inclined to run should be steadied to about 4 miles an hour, or they will not stand a long journey. Birds in good condition could be taken 25 miles in one day, by pushing them along at a quiet run on the level or down hill for short distances, but they could not travel this distance from day to day.

The writer has seen a mob of birds driven 50 miles in two days, but it was as much as they could do, and two of them had to be hobbled and put in a cart for the last few miles. To hobble a bird, his two legs should be fastened together tightly by a strap or rope passing over the front of the body just behind where the wings leave the body, the hobble being attached to the legs as near the ankle joint as possible or just above it. When a bird is sitting down it is quite easy to fix the hobble.

In moving one or two pairs of birds across country it is safer to convey them by waggon. A frame, 6 feet high, is rigged on the waggon, made out of strong poles or battens, and covered by a sheet or tarpaulin so that the birds cannot see out. At the rear end of the waggon the frame should be made detachable, to facilitate loading and unloading. The frame all round should be particularly strong—about 3 to 4 feet from the floor—to support the weight of the birds in case of swaying or jolting on rough roads. The birds can be loaded (or unloaded) by being pushed up a sloping way of two or three planks, after they have been hooded. The hoods can be taken off as soon as the birds are under the frame and cannot see out.

When droving birds along a road a sharp look-out should be kept for dogs, as a mob may easily be stampeded by a dog rushing in on them.

If a bird should break away, never allow anyone to gallop after him, as he will only go the faster and get more frightened. If you can head him off and turn him at once, well and good; but if not, let him go, and he will probably pull up before he has gone far. Follow him, quietly working round him, until you can turn him in the direction you want. Patience is a virtue in droving birds, as they can often be coaxed and humbugged into going past anything or through a gate, when if they were rushed and hustled at it they would not go through at all. Should one or two birds shy at a gateway when the rest of the mob has gone through, keep the latter as close to the gate as possible, and try to coax the frightened ones up to them. If this is no good, you must either bring fifteen or twenty quiet birds back through the gateway and put the troublesome ones through with them, or, as a final resort, catch and hood the offenders and push them through. Birds will naturally keep in a mob, and should be allowed to spread a little to feed as they go along.

The Management of Breeding Birds.

There are different systems followed for the management of breeding birds. The most usual practice in South Africa is to put a pair of birds in a small paddock of about 1 to 2 acres, laid down in lucerne, or with at least ¾ of an acre of this crop. In these small paddocks they are left to make

their nests and hatch out their eggs, the chicks being taken away from them and hand-reared when about a week to ten days old. They are left in these paddocks all the year round, and may be expected to bring out two to three nests a year. The paddocks should be as quiet and secluded as possible, so that nothing will prevent the birds from paying strict attention to their nests. They cannot be expected to sit and hatch successfully if they are worried by other birds or men continually near their paddocks.

Breeding paddocks should be separated from each other by a space of at least 6 or 8 feet. The cocks are apt to fight if separated only by a single fence, and very likely injure themselves. If there is no shelter in the paddock one should be provided. Four posts about 10 feet by 9 feet apart, with five sheets of 10-feet curved corrugated galvanized iron as a roof, is a form of shelter used in South Africa, the posts being from 6 to 7 feet out of the ground.

It is advisable to supply broken-up bones to breeders when laying.

The nest is simply a shallow scoop in the ground, in which the hen lays from 12 to 16 eggs on an average before hatching is commenced. The hen lays every second day. The hatching takes forty-two days, though some pairs will hatch out their chicks one or two days earlier than this.

To protect the nest from getting flooded out in wet weather, it is a good plan to raise its level above the ground by carting a dray-load of sand to the spot selected by the birds. This should be spread out in the shape of a circular mound about 6 feet in diameter, when a shallow scoop should be made in the centre, in which the eggs are placed. This should be done when the birds have got about 5 or 6 eggs in the nest. Once the birds commence to sit they must on no account be disturbed or excited in any way.

Natural and Artificial Incubation.

Some farmers take the eggs from the birds when they have been sat upon about a fortnight or three weeks, and finish them off in incubators. Others incubate the eggs entirely, taking them from the nests as laid, leaving two or three as nest eggs to coax the hens to keep on laying. Others again keep inferior birds to hatch the eggs for the stud birds. There should, however, always be an incubator ready in case of accidents.

It is not advisable to force breeders to lay more eggs than nature meant them to lay, as the result will only be weakly chicks, though by high feeding birds can be made to lay nearly all the year round. They will produce far healthier and better constitutioned chicks if they bring out not more than three nests in the year.

The writer has got the best results from incubators worked on the hot water system, as distinct from the hot air system, though in South Africa they appear to use both kinds.

Great care is necessary when incubating ostrich eggs, or they will be spoilt in the first few days. The temperature should not be allowed to rise above 98 degrees for the first week, above 99 degrees for the second week, above

100 degrees for the third week, and for the rest of the hatch should not go above 101 degrees.

These are the maximum temperatures to work to, though they may be one or two degrees under these at times.

When plucking breeders, it is customary to only take the quill line of feathers and a few of the longest "tops," as they require the feathers to cover their eggs properly. Nothing should be done to the feathers while the birds are hatching; it is preferable to risk the feathers being spoilt by being left on too long. Sometimes there is trouble in mating birds, as the cock gets so savage that he frightens the hen, and she will not sit for him. This has never happened to the writer, who consequently cannot speak from direct experience. One way to overcome this is to move the cock to a bare paddock for a while, and keep him short of feed; when he has calmed down he can be put back to the hen, when he will probably be all right. Never put the hen into the cock's paddock, as he will most likely do his best to kick her out of it.

Eggs can be tested at night by holding them up to a candle lamp with one hand, and shading the top of the egg with the other, so that the line of the air space can be distinctly seen. This line in a good egg is always sharp and well defined.

Rearing Chicks.

Take the chicks out of the incubator about three hours after they are clear of the shell, by which time they should be dry, and put them in a sheltered pen in the sun and out of the wind, on sandy ground for choice. They should have fine gravel and their own egg shells broken up small to pick at. If a chick gets clear of its shell too late in the afternoon to be put out, leave him in the incubator until the next morning.

They should not be put out in the morning until the sun is well up. If the weather is wet or too cold and without sunshine, put the chicks in a shed where there is plenty of light. Here it will be necessary to have something to keep them warm; a heating stove, or a fire made in an old oil drum will serve the purpose. Put a ring of netting round this about 12 inches to 18 inches from it, so that the chicks cannot get too close. They will get as close to the heat as they can, and when they get warm will go and pick about and come back to it.

They will eat practically no food the first two days, but will pick gravel and egg shell. The yolk which they have absorbed just before hatching out is sufficient to sustain them for the first four days if necessary. They can generally stand up the second day. The second and third days they should be given a little lucerne finely cut up, and also the same mixed with a little bran just moist.

They do not require water for the first three days except in extremely hot weather, and then it should only be given to them in a shallow dish, as they will be sure to tumble into it. It is best to watch them have a drink and then remove the dish.

Should the sun be too hot in the pen, a piece of hessian or a bran bag opened up may be stretched across the top for shade.

At night any weakly ones should be put back in the incubator; the others may be camped in empty kerosene boxes in a warm room or shed. A bran bag put into the box makes a good lining, and about an inch of dry sand should be put in the bottom of the box, so as to keep the bag clean and dry. A kerosene box will hold four or five chicks at this stage. The boxes should be covered over with a bran bag, leaving a small opening for air, according to the temperature. The boxes should be cleaned and put in the sun daily, as also the bags, the sand being changed.

If chicks are too hot at night, they will be seen to sit or stand up and open their wings, at the same time breathing rapidly with their beaks open. In this case more air should be given. As a general rule you can hardly keep your chicks too warm, and they must never be allowed to feel cold or get wet.

From the fourth day on they should be put in pens on short young lucerne, the pens being shifted as required. They should also at first have some cut up lucerne mixed with a little moist bran fed to them on boards or in small troughs, until it is seen that they are feeding properly on the growing lucerne.

If lucerne is not available to run them on, their pens should be put where there is any green picking, and they must be fed with bran and lucerne every few hours at first, gradually easing off to three or four feeds a day as they grow stronger. They should also always have plenty of gravel and broken-up bones to pick as they feel inclined. Water should be given in shallow troughs. Watch carefully that none get bound up or constipated; the dung should be quite soft, and a certain amount of limy watery fluid excreted at the same time.

When a chick gets bound the intestines can be felt quite hard under the stomach. The safest thing to give is an enema of soap and warm water, with a small syringe. Never give chicks any food that is likely to cause constipation. Chicks feeding naturally on young fresh lucerne should never get constipated. One cause is their habit of picking up old droppings if they can get them, and for this reason it is essential to keep their surroundings swept up and clean.

They can gradually be transferred from their boxes at night and camped in small pens, or a race divided off into pens.

Always keep chicks of equal sizes together. If this is not done the bigger ones are apt to knock the weaker ones over, and trample on them. Special notice of this must be taken when camping them down at night.

As the chicks grow up they should be let out very early in the mornings, or they will start eating the dung in their pens, which is bad for them. They must be shedded in wet weather until they are from two and a half to three months old, when they can be left out altogether. The sooner they can be left out at night the better, but this will depend greatly on the time of year and on the temperature.

Care should be taken not to let chicks get at any broken glass, as they will pick at anything bright and shiny, and a sharp piece of glass, if swallowed, may very likely cause trouble. Chicks should always have access to a good dusting ground, such as a heap of dry ashes.

Chicks can be marked when quite young by pulling out a small patch of the hair or down on top of the head. When they are from a month to six weeks old a thin wire can be passed through the loose flesh where the wing joins the body, and a small metal tab with a number can be attached to the wire.

Chicks should never be frightened or rushed about, but should always be taken quietly. If properly treated they become very tame, and will follow you almost anywhere. An old steady sheep dog that will work wide is very useful for rounding up chicks at night, when being brought up to the shed, but he must not be allowed to come in too close to them.

General Management of Birds.

Birds should be kept in separate mobs according to their age, at least until they are fully grown, say three years old. Old cocks are apt to bully the young ones and chase them about, especially during the breeding season, July to about February.

Birds can be run in mobs up to about 100, but a larger number than this in one paddock is rather unwieldy, and about sixty to eighty is the more convenient number.

To enable the birds to grow the best feathers they should be on good feed and in good condition, especially during the first three or four months of the feather growth. If pinched during this time or allowed to get in low condition they are likely to give "barred" feathers, that is, feathers with marks right across them. These bars are similar to a break in the wool with sheep that have been through a hard time. A common practice in South Africa is to run the birds on lucerne while they are growing their feathers, and to turn them out on the veld after they are plucked until it is time to quill them, when they are put back on the lucerne.

The general opinion seems to be that lucerne should be the main food, but a certain amount of natural picking is good for the health of the bird.

Where the soil and plant life is not rich in alkalies it will be found necessary to give birds broken-up bones, about the size of ordinary road metal.

Birds can be branded on the thigh with brands made out of No. 4 or No. 6 fencing wire. The brand should be put on carefully and quickly, as the skin is thin, and an oily rag at once wiped over it. The brand will only show clearly for about two years.

They can also be marked with an aluminium button put through the loose flesh where the wing joins the body. If the proper button is not available a wire put through the same place with a metal tab threaded on to it will be found to act nearly as well.

It is convenient, as far as possible, to keep in one mob birds that are due to pluck at the same time.

The more often you ride through your birds the quieter and more easily managed they will be. If put away in a big paddock where no one goes near them they will soon get wild, and probably give a lot of trouble when they have to be mustered.

Some cocks get very savage at certain times of the year, and will attack anyone on foot or on horseback coming into their paddock. The usual mode of protection is to carry a bush or forked stick, which is thrust at the bird's head or neck as he comes in.

There is another way which was originated on the writer's own property, and is now the only method used there. This method is to carry a cane about 4 feet long (those in use are old polo stick handles), and when the bird attacks you to hit him across the neck with this cane. Great care must be taken never to hit a bird near the head or you might kill him.

The effect of a good tap on the neck seems to be very like what a knock-out blow is to a prizefighter, and though the writer has frequently knocked birds down in this way, it does not seem to injure them at all, and no birds have been killed or damaged by this method since it has been in use during the last three years. Ostriches should never be teased or aggravated, and require to be taken quietly but firmly. It is mostly a game of bluff with a savage bird, and he will rarely come in to you if he sees that you are ready for him, and not afraid of him.

The faster you move the more it excites a bird, and if you stand quite still he will often become perfectly quiet; as soon as you move again, however, he will probably want to attack you. Only one bird will attack you at a time; if two happen to come up they are sure to go for each other.

Hens only get savage when they have chicks, or near the end of a hatch before the chicks come out.

Never let a bird think that he has got the best of you, or he will be all the more trouble the next time. They soon learn that they cannot touch you, and if properly treated will not come in, though they must not be given an opportunity to do so.

A bird sometimes gets a large piece of bone stuck in his neck. This can generally be worked out again through the mouth, but if this is not possible an incision must be made in the neck, avoiding the hard windpipe. The skin should first be drawn to one side, so that the cuts through the skin and through the flesh do not coincide afterwards. Ostriches get over very bad wounds in a most wonderful manner, the flesh healing very readily if given the slightest chance.

As long as a bird will feed he is practically sure to recover from the worst wound. The writer has known a bird unable to stand up for three weeks, and then recover perfectly. A broken leg is practically hopeless, but a broken wing, if taken in time, can be tied over the back to the other wing, so that it comes into place. It will then set, and soon be all right again.

In the writer's experience there is no disease that the ostrich is liable to in New South Wales. To give a bird a drench, open the bill and grasp the lower part with one hand, putting three fingers of this hand down the throat to keep the windpipe closed. Hold the top part of the bill with the other hand, when an assistant can pour the drench down the bird's throat. A couple of ounces of Epsom salts is a safe drench for a full-grown bird.

Plucking.

The ordinary practice is to cut the quill line or large feathers when the blood vein in the quill has receded to where the quill goes into the flesh.

The quills are cut about an inch below where the flue of the feather ends, thus causing no pain to the bird.

This quill line comprises what are termed the "whites" and "byocks" feathers. The two rows of feathers next to the quills are then plucked; some farmers take three rows. These are the "blacks" from the cock birds, and the "drabs" from the hens, and are known as the "tops."

Two to three rows under the wing may also be plucked; these are called the "floss." The tails, as a rule with cock birds, are cut, and with the hen birds are plucked.

The stumps of the quill line, and of the tail (if cut) are allowed to remain in from two to three months; they are then quite dry and dead, and are pulled out with ordinary pliers, care being taken to pull them out straight and not twist them. This operation is called "quilling."

Everything should be done to grow the whites as perfect as possible, as they are by far the most valuable feathers.

Should a bird have odd feathers, that is, feathers that are not ripe from any cause when the main crop is fit to take, they should be left until ripe, when they can be cut and the stumps left in until the next quilling. The object should always be to get a level crop—that is, to get all the feathers ripe at the same time; and this can only be done by drawing all the stumps at the same time.

It has been found that a bird will always grow better feathers if they are all growing together and getting ripe together.

At quilling time the tops that have been plucked will be from 2 inches to 4 inches long, and will protect the quills while growing. A bird should never be quilled when in poor condition, as his feathers will not start growing together, and will not have sufficient nourishment to grow well.

Some farmers pluck their birds every eight months, some every nine months, and some every twelve months. The feeding of the birds and their general condition has mostly to do with this difference.

It is a great mistake, however, to force the birds to grow feathers oftener than their feeding and general condition permits; they will do so, but the feathers will suffer in quality.

The general time in South Africa seems to be about nine months, and the writer has found that this time is the most likely to produce the best results

in this State. He leaves the quills in for three months, thus giving the bird a bit of a rest as far as feather growing is concerned.

Chicks may be plucked for the first time at from seven to eight months old according to how they thrive, but the writer considers it a great mistake to take chicken feathers before they are quite fully ripe, as is the practice on some farms. It is preferable for them to be overripe in order to let the sockets thoroughly form and harden.

When taking the feathers each kind (quills, tops, floss, and tails) should be packed and tied separately from each bird, the cock's pluckings being kept separate from those of the hen.

It is risky to pluck a bird when in low condition, as, if you happen to get a cold change soon afterwards, the bird is apt to get pneumonia and die. If in doubt it is better to just cut the quills and tail, and leave the rest on, which will be sufficient to keep the bird warm. He can be plucked later and then quilled after that again, which will keep his crop level. Many farmers do not take the floss feathers, as they consider them of more value as a protection to the bird than their actual money value. As before mentioned, the real value is in the quill line, and everything should be sacrificed to ensure its best growth.

Ostriches live to a good old age, over twenty-five years, and continue to give good feathers if the latter are taken carefully and in the proper manner. A bird reaches his best feather-producing stage at about three years old.

A Chicken Feed Mixture.

The following is recommended by the Poultry Expert:—

	lb.
Ground Wheat	40
do Maize	25
Kibbled Oats (Hulled)	15
Millet Seed	10
Hemp Seed	4
Sterilised Bone Meal	6
	100 lb.

To be mixed thoroughly.

Finely ground shell grit should be provided.

A simple way of feeding chickens is to give them rolled oats or pin-head oatmeal for the first two days. Subsequently they should be given pollard and bran mash mixed with milk to a very crumbly consistency, and this should be fed during the day at intervals of two hours each, giving the mixture recommended above at the evening meal, not so often as the chickens grow older; or they may be fed exclusively on the mixture recommended, after the first two days, but it is considered that better growth is obtained from the partial-mash feeding.

Mating Fowls for Utility Purposes.

JAMES HADLINGTON.

WELL bred birds are essential, if uniform results are to be obtained. Type, for instance, is the quality that carries the characteristics of the respective breeds. Each breed has its own definite type, and this must be fully grasped before intelligent mating can be accomplished. Breeders, even only for utility purposes, will do well to pay more attention to this matter, and carefully study the standard for the breed. It is not at all difficult to master sufficient of the requirements in type for the purpose of the utility breeder, who is more concerned in shape, outline, weight, and general conformation of the birds than with the finer points for show purposes. A fowl is not necessarily a Leghorn because it is white, or an Orpington because it is black. It is one or the other because it conforms to the shape and general characteristics of its particular breed.

Mating birds, merely because they lay so many eggs, will not preserve the characteristics of the bird that lays them. Under that system the breeds would be lost, and the power to produce with it. Therefore, it is necessary to aim first at perpetuating the breed it is intended to keep. Then concentrate upon improvement on lines it is wished to perpetuate, whether that be eggs or flesh, because no matter how good the foundation stock obtained, if the subsequent matings are not made with skill and judgment, their good qualities will be lost. Apart from line breeding, the main consideration in careful mating to produce uniform results is affinity of type. From what has already been said in this regard, it will be noted that fixity of type alone can be depended upon to carry the characteristics of a given breed; but it should be borne in mind that there are always some differences in interpretation of type that amount to nothing more than a family or strain likeness. Notwithstanding these variations, they may conform to generally accepted type. These strain likenesses may amount to much or little, and when introducing new blood, one needs to be somewhat careful in this respect, because any rude clashing of types will almost certainly end in disaster to the acquired traits.

Factors in Mating and Introduction of New Blood.

It is not sufficient to acquire birds of good strain, type, stamina, and prepotency, and imagine that nothing further is required. Careful selection is required in mating to preserve these qualities. When line breeding has not been followed, frequent introduction of new blood will be required, and if this is carried out as it should be, this new blood can be partially—in fact, almost wholly—proved before using it on the main flock. To do this, some new cockerels should be brought in each year, and mated to some of the "home"

hens or pullets to form a pen to breed males for distribution over the main breeders as desired. The pullets bred from these matings will commence to lay, if hatched at the right time, *i.e.*, in August or September, and will have shown their winter performance before it is necessary to use the cockerels in the pens; and since the winter performance of a pullet is generally a true index to her productive capacity, you have proved the sisters of the cockerels you are about to introduce into your main flock before using them. Development and other qualities will, of course, be evident.

In addition to the males thus bred for distribution over the main breeders, the pullets can likewise be mated to some of the "home" males, thus forming two groups, each containing a quarter of the new blood. These may be brought together again, giving a large predominance of the "home" blood. Every

One of the Best Layers.
Single Pen Test, Hawkesbury Agricultural College, 1913-14.

The Worst Layer.
Single Pen Test, Hawkesbury Agricultural College, 1913-14.

The above photographs emphasise the importance of correct type in connection with laying qualities, no less than the maintenance of the standard of the breed.

mating with new blood may not be successful; therefore, it is necessary to have test matings coming on each year, then, since the useful breeding life is at least 2 years, fully half of the test matings can be rejected if necessary. By this means very much less risk is run in introducing something that may cause deterioration from your own standards; but all this involves making dispositions a year ahead.

In mating for egg production, it is not sufficient to mate up the best layer to the best bred cock obtainable. All the factors mentioned above must enter into the calculation. First aim at maintaining the breed, then at improving its capacity. The best layer does not necessarily produce the most prolific progeny. In fact, it is of more importance that the male bird be bred

from a good layer, because fecundity is more likely to be transmitted through the male bird than the female, and better results will be obtained by using males bred from prolific females mated to hens of good flock average than *vice versâ*. It has also this in its favour, that stamina is more likely to be maintained.

Weights.

It is not easy for the novice to correctly gauge the type required, but weights, at any rate, are something easy to grasp. In this connection it may be stated as an illustration, that in White Leghorns, cockerels of, say, ten to twelve months old should approximate 5 to 6 lb., pullets of the same age from 4 to 5 lb., cocks from twelve to eighteen months 6 to 7 lb., and hens of that age from 5 to 6 lb. These are for what we designate the Australian type of Leghorn, which has been found to produce such good results at the Hawkesbury laying competitions. Then in Orpingtons of the same ages, it is desirable that cockerels should weigh 6 to 7 lb., cocks 7 to 9 lb., pullets 5 to 6 lb., and hens 6 to 7 lb. In the latter breed, which is a dual purpose fowl, 1 lb. at least higher in each case is required if table birds or show quality is the aim, but it must here be remembered, that the heavier the weight, taken as a general rule, the less prolific. In other words, the bird that puts on flesh is the ideal table fowl, while the lighter weights are invariably the layers. Both are not obtainable in one bird, and I will here say unreservedly, that if we desire to preserve the Orpington as a dual purpose breed, we must sacrifice something in prolificness.

In mating for size, as is the aim for table poultry, it must be borne in mind that contrary to the generally accepted notion of using large males, the female is a great factor in producing size. But here again the influence of the preceding matings is felt; therefore, to go to the other extreme, and use weedy males, would be to encounter trouble at another stage.

Stamina.

Stamina in the birds to be mated is most important if the foundation is to be well and truly laid. Unfortunately, stamina is not a measurable or always a visible quality. At the same time, there are some unmistakable signs that portray it, such as bodily development, symmetry and proportion, brightness of the eye, and general alert comportment; all these are indicative of vigour.

Prepotency.

Prepotency is the quality inherent in a bird or strain that has the power to stamp itself upon its progeny in a marked degree. This quality results mostly from careful breeding on definite lines of blood of a given type; but it is sometimes found in birds of no particular breeding. In these cases, stamina has played the part. Even this will show how necessary that quality is.

Ages to mate.

I find a prevailing impression that has been created among beginners, that it is necessary to mate two-year-old hens with first season cockerels, or *vice*

versâ. While there is much to be said in favour of such matings, it is not absolutely necessary that they should be made in this way. Pullets of, say, ten months and over, and cockerels of the same age, if well developed, are quite fit to breed from, and with this in their favour, that more fertile eggs are obtainable from them in the early spring than from older birds. Some of our most successful utility breeders use mostly birds of ten to twelve months for early mating.

Number of Females to a Male.

As a general rule, ten to twelve females in the lighter Mediterranean breeds, such as Leghorns, give good results, while six to eight is a recognised complement for one male in such breeds as Orpingtons or Plymouth Rocks. But here again the factor of vigour comes into play and must be taken into account. But it is here necessary to state that it is important that sufficient females are allowed. Many failures occur through insufficient females, and often the failures in fertility result from pairs and trios. To get over this, where a start is being made with such small numbers, no harm will result from putting in the pen some hens of another breed, laying a different coloured egg; the pure eggs can then be set.

Line-Breeding from a Utility Point of View.

The value of line-breeding to the utility poultry-keeper would be inestimable if its practicability presented fewer difficulties. Unfortunately, it is not as simple a matter as would appear on the surface, owing principally to two factors: First, the short life of our "subject," and second, the difficulty in obtaining sufficiently "stable" bred stock for our foundation—that is to say, stock with inherited tendencies sufficiently fixed to enable us to know definitely and without doubt the blood we are about to operate upon. In the present state of poultry-keeping, if we succeed in obtaining inherited tendency in the direction of egg production, for instance, we most likely fail in other qualities which are essential to the maintenance of the breed itself. This will be changed some day, when breeders more fully recognise their responsibility in respect of the characteristics of the breeds. Unfortunately, unlike the larger and longer-lived animals, such as cattle, sheep, and horses, we have no stud-book or pedigrees to work upon, other than individual breeder's records, which, in most cases, are lacking in sufficient data to enable us to base calculations upon to form our starting point. In other words, we have to confide a great deal, and know nothing definite, except the fact that we are not absolutely sure of our ground. Therefore, we start with a handicap that is calculated to upset some of our most cherished aspirations before we have proceeded very far on our line-breeding way.

As an illustration, we may select birds as near as possible to our ideals, as judged by experience, and lines laid down for our procedure, only to find that in the first or second generation, some fault, due to former infusion of blood has developed, and, if we proceed as per chart, we only accentuate that fault. We may then adjudge upon which side this fault has come, but

we are helpless from the fact of the short life of our "subjects"; probably one or both originals are dead or impotent, and there is nothing to do but to jettison the whole scheme. Then again, supposing we are able to obtain records of laying as our basis, I fear we shall find other essential qualities, such as type, left entirely out of the calculation. It will have been gathered from the remarks on that qualification how necessary it is to the preservation of the characteristics of a breed, and no line-breeding can be considered complete that does not take into consideration the points made under that head. For it must be remembered that, contrary to the general notion, line-breeding does not claim to improve, so much as to perpetuate, qualities already existent. Improvement must come from selection. Every breeder knows that constant vigilance is necessary to keep undesirable traits from asserting themselves. In this connection it must be emphasised that any feature once introduced takes very many generations to entirely eradicate—in fact, it is incalculable how many generations would be necessary for its eradication.

Line-Breeding.

In explanation of line-breeding, it is doubtful if anything yet published on the subject is as explicit or complete as the chart drawn up by Mr. J. K. Felch, an American breeder, and the explanation of it published in Lewis Wright's "New Book of Poultry," which was given in the *Agricultural Gazette* for October, 1912. Its mathematical precision is as 2 and 2 makes 4; therefore, it does not lend itself to amendment or modification, and is accepted as "standard" in character. But let it not be supposed that it is followed to anything like the extent with fowls that some would have us believe, but rather let us accept it as a scientific hypothesis of breeding principles.

Ophthalmia in Chicks.

A correspondent at Mount Druitt called attention to a serious trouble among his chicks. The first symptoms were an enlarged watery eye, which soon got closed, and the head seemed to swell. There were slight signs of diarrhœa. The chicks moped about till they died.

In reply, Mr. Hadlington, Poultry Expert, stated that trouble appeared to be ophthalmia, of which numerous cases had been reported this spring. It is apparently infectious. The following treatment is recommended:—

Dress the eyes of the affected birds night and morning with an ointment made of the undernoted ingredients:—

Yellow Oxide of Mercury	16 grains.
Boracic Acid	1 drachm.
Vaseline	2 ounces.

This dressing should be continued until the film which will be noticed to be growing over the eyes, has almost disappeared. The eyes should then be bathed twice a day with a solution of boracic in the proportion of a teaspoonful to a pint of water, until the inflammation has subsided.

It should be noted that the use of the ointment should be discontinued when the bathing is commenced.

Seasonable Work for Poultry Keepers.

JAMES HADLINGTON.

February.

AUTUMN hatching will now be in full swing upon the farms where it is practised. But it is not carried on to anything like the extent that it might be. Unlike cooler latitudes, the climate of New South Wales for the most part is favourable for two hatching seasons, one from July to October, and the other, under congenial conditions, during February and March. The conditions necessary to profitable autumn hatching are :—first a large number of stock from which to select breeders to continue on, because many may have gone into moult and become unfit for breeders ; next, a plant that has been spelled for a couple of months from the spring chickens before being required to accommodate the autumn batch ; and third, fresh ground to run them on after they leave the brooder. This is absolutely necessary if success is to be attained. To continuously run chickens over the same ground all the year round is to court disaster in rearing. The prospects of autumn hatching are that although the pullets hatched at this season are fully 25 per cent. worse layers than the spring-hatched ones, the cockerels at 5 months old, being out of season, are worth fully 1s. 6d. to 2s. 6d. per pair more in the Sydney market, because these come in at a time when good table cockerels are almost unobtainable.

Hatching can be carried on right through to join the spring operations, but there are some factors against it. These are a large percentage of infertility, high market rates for eggs, and the fact that chickens do not thrive so well during the winter months. There is also the very strong objection to continuously running chickens without a break to spell the plant. All these factors are against any extensive hatching operations between March and July.

Moulting Season.

As the moulting season approaches, the hens will slacken off laying, and the culling out of those it is intended to dispose of should be completed, and attention concentrated upon those being kept, doing all that is possible for the health and well-being of the birds during the moult. This is a trying time for most of them, and their profitableness after the moult depends very largely upon the care and attention bestowed upon them at this time. In any large flock of hens, three different conditions are usually met with and these require different treatment in regard to feed. Therefore, wherever possible, it is a good plan to divide them into different groups for the purpose, feeding each according as their condition indicates. First we have the hens in fair fleshy condition. When these stop laying they should be yarded by

themselves and fed sparingly until they have shed a considerable quantity of feathers and have commenced making new ones, then fed well. Second, we have the spare-bodied hens that appear to be more or less studded with old and new feathers. These are often consistent layers, even through the moulting season, in fact they seem to have no regular moult, but may be found laying more or less all through. These, too, require full and plenty of good feed at all times. The third class are the fleshy hens that will probably keep fat all though the moulting time, and are generally heavy eaters. This is the class that, if fed all they will eat, run to flesh and generally fail to come up to expectation as layers. These need specially careful feeding, kept rather underfed, and on coarser material, using plenty of roughage, such as green feed, and should be made work for what they get. At this period extra care should be exercised in keeping down vermin, and the dust baths should receive special attention, and a little flowers of sulphur mixed through the contents. Flowers of sulphur should be put in the feed at the rate of 1 ounce to 50 adults at least twice per week during the moult. Iron tonics too are helpful at this period. For this purpose, sulphate of iron put in the drinking water at the rate of 1 ounce to 30 gallons of water, with ¼ ounce of sulphuric acid, constitutes about the cheapest iron tonic for fowls. It can be given three or four times a week during the moult. Great care should be taken in handling the sulphuric acid, and in adding it to the water.

Treatment of Valuable Stud Birds.

Valuable stud roosters should also receive special attention. Many birds fag during the moult, lose condition, and are likely to get so low as to be of little use afterwards. They should be examined now and again to see if they are keeping free from vermin; if not, they should be dusted thoroughly with equal parts of ashes and sulphur, by means of a flour dredge. This will be found the cheapest and a very effective insecticide. Any that go light had better be separated from the hens, and put into a small coop or house by themselves, and well fed. Should they go off their feed, the following tonic powder and condiment may be given with much advantage, lightly dusted over their pollard mash :—

Liquorice Powder	1 oz.
Ginger	1 „
Aniseed	½ „
Pimento	2 „
Sulphate of Iron	1 „

Soft feed may be substituted for grain at night until improvement takes place.

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

Branch.	Honorary Secretary.
Albury	Mr. J. D. Lankester, Albury.
Baan Baa	Mr. P. Gilbert, Baan Baa.
Balldale	Mr. H. Elrington, Balldale.
Bathurst	Mr. J. McIntyre, Orton Park.
Batlow	Mr. A. C. Arnot, Batlow.
Beckom	Mr. S. Stinson, Beckom.
Bonville	Mr. H. B. Faviell, Bonville.
Borambil	Mr. H. A. D. Crossman, "Homewood," Quirindi.
Bungalong	Mr. G. H. Pereira, "Springdale," Cowra Road, *viâ* Cowra.
Canadian	Mr. C. Smith, Canadian Lead.
Cardiff	Mr. F. B. Cherry, Cardiff.
Carlingford	Mr. D. K. Otton, Carlingford.
Collie	Mr. C. J. Rowcliff.
Coonabarabran	Dr. F. G. Failes, Coonabarabran.
Coradgery	Mr. G. C. Harris, Wallandra, Parkes.
Coreen-Burraja	Mr. N. B. Alston, Coreen, *viâ* Corowa.
Cowra	Mr. E. P. Todhunter, Cowra.
Crudine	Mr. F. W. Clarke, Crudine.
Cundletown	Mr. S. A. Levick, Roseneath, Cundletown.
Deniliquin	Mr. W. J. Adams, jun., Deniliquin.
Derrain	Mr. A. P. Hunter, Red Bank Creek, Matong.
Dubbo	Mr. T. A. Nicholas, Dubbo.
Dunedoo	Mr. G. E. Alexander, Dunedoo.
Erudgere	Mr. Frank Hughes, Erudgere.
Fernbrook	Mr. W. Marks, Yarrum Creek, Dorrigo.
Forest Creek	Mr. W. Thompson, Forest Creek, Frogmore.
Garra and Pinecliff	Mr. A. S. Blackwood, "Netherton," Garra, *viâ* Pinecliff.
Gerringong	Mr. J. Miller, Gerringong.
Grenfell	Mr. G. Cousins, Grenfell.
Gunning	Mr. E. H. Turner, Gunning.
Henty	Mr. H. W. Smith, Henty.
Hillston	Mr. M. Knechtli, Hillston.
Inverell	Mr. W. A. Kook, Rock Mount, Inverell.
Jerrara	Mr. A. O. Lane, Public School, Mullengrove, Wheeo.
Jiggi	Mr. D. Gibson, Daru Farm, Jiggi.
Jindabyne	Mr. Sylvester Kennedy, Jindabyne
Katoomba	Mr. C. Wooller, Oliva Park Farm, Katoomba.
Keepit, Manilla	Mr. J. B. Fitzgerald. Keepit, *viâ* Manilla.
Kellyville	Mr. Joseph Nutter, Kellyville.
Kenthurst	Mr. J. R. Jones, Kenthurst.
Leech's Gully	Mr. J. Donnelly, Leech's Gully, Tenterfield.
Little Plain	Mr. F. S. Stening, Little Plain, *viâ* Inverell.
Lower Portland	Mr. W. C. Gambrill, Lower Portland.
Mangrove Mountain	Mr. G. T. Hunt, Mangrove Mountain, *viâ* Gosford.
Martin's Creek	Mr. P. Laney, Martin's Creek, *viâ* Paterson.
Middle Dural	Mr. J. W. Thacker (*pro tem*), Middle Dural.
Milbrulong	Mr. O. Ludwig, Milbrulong.
Moruya	Mr. P. Flynn, Moruya.
Narellan	Mr. G. J. Richardson, Narellan.
Narrandera	Mr. C. F. Pearce, Narrandera.
Nelson's Plains	Mr. V. Schlaadt, Nelson's Plains
New Italy	Mr. F. A. Morandini, New Italy.
Nimbin	Mr. J. H. Hutchinson, Nimbin.
Orangeville	Mr. C. Duck, Orangeville.
Orchard Hills (Penrith)	Mr. H. Basedow, Orchard Hills, *viâ* Penrith.
Parkesbourne	Mr. W. H. Weatherstone, Parkesbourne.

Branch.	Honorary Secretary.
Peak Hill	Mr. A. R. Pettigrew, Peak Hill.
Penrose–Kareela	Mr. L. Pieremont, "Vila," Penrose.
Ponto	Mr. A. D. Dunkley, Ponto.
Redbank	Mr. J. A. Graham, Woodlands, McAlister, *via* Goulburn.
Ringwood	Mr. Wm. Tait, Ringwood.
St. Mary's	Mr. W. Morris, Queen and Victoria Streets, St. Mary's.
Sackville	Mr. Arthur Manning, Sackville.
Sherwood	Mr. J. E. Davis, Sherwood.
Stockinbingal	Mr. J. Neville, Stockinbingal.
St. John's Park	Mr. J. C. Scott, St. John's Park.
Tallawang	Mr. J. E. Hansall, Tallawang.
Taralga	Mr. Dave Mullaney, Stonequarry, Taralga.
Toronto	Mr. J. G. Desreaux, Esmond, Toronto.
Tumbarumba	Mr. R. Livingstone, Tumbarumba.
Upper Belmore	Mr. A. W. Fowler, Upper Belmore.
Uralla	Mr. E. A. Neil, Uralla.
Wagga	Mr. Thos. Fraser, Aberfeldie, Wagga.
Walla Walla	Mr. H. Smith, Walla Walla.
Wallendbeen	Mr. W. J. Cartwright, Wallendbeen.
Walli	Mr. A. V. Bloomfield, Walli.
Wetherill Park	Mr. L. Rainbow, Wetherill Park.
Wollun	Mr. C. E. Burke, Private Bag, Wollun.
Wolseley Park	Mr. H. McEachern, Wolseley Park.
Wyan	Mr. C. W. Harper, Myrtle Creek Railway Station.
Wyong	Mr. Edgar J. Johns, Wyong.
Yass	Mr. Cyril Ferris, Yass.

Notice to Honorary Secretaries.

It is important that a record of the meetings of the branches should be inserted in the *Agricultural Gazette*, and honorary secretaries are invited to forward to the Department a short account of the proceedings of each meeting, with a brief summary of any paper which may have been read, and the discussion that followed it, as early as possible after each meeting. Notes for insertion in the *Agricultural Gazette* must reach the Department before the 16th to ensure insertion in the following month's issue.

Insect Pests.—Quite a number of the branches have availed themselves of the Department's offer to supply a set of insects, being the common pests of the district, and the collections are now being cased. The Government Entomologist suggests that as each district has certain pests peculiar to its orchards and gardens, more useful work would be done if the members themselves collected the local pests (orchard, garden, and stock) and sent them to the Department, where they would be arranged, mounted, a descriptive label attached, and returned to the branch. Mr. Froggatt considers that such a collection would have a far greater value, as there would be more interest attached to the specimens when the members knew exactly where the pests came from, and where and how to find them.

Demonstrations in Clearing Land and Subsoiling with Explosives.

Demonstrations in clearing land and subsoiling with explosives will be given by Mr. H. C. Coggins, Assistant Inspector of Agriculture, to branches of the Agricultural Bureau. Branches who wish to take advantage of this offer are requested to make early application to the Department through their honorary secretaries.

Veterinary Lectures.

In connection with the lectures to branches of the Agricultural Bureau, it is herewith pointed out for the information of honorary secretaries that the following is the list of subjects of lectures which can be delivered to them:—

Horses.—(1) Conformation and Unsoundness (with lantern illustrations); (2) Colic and Treatment of Wounds; (3) Strangles, Influenza, and Tetanus.

Cattle.—(1) Tuberculosis (with lantern illustrations); (2) Contagious Abortion and Contagious Mammitis; (3) Ticks, Tick Fever, Tick Infestation and Eradication.

Sheep.—Parasitic Diseases of Sheep.

Pigs.—Diseases of Pigs.

General.—(1) Parturition of Farm Animals (with lantern illustrations); (2) Feeding of Farm Animals and Dietetic Diseases; (3) Sterility: Causes and Treatment in all classes of Stock.

Bee-keeping.

A series of lectures on bee-keeping is being arranged by Mr. R. G. Warry, Instructor in Apiculture. Secretaries, whose branches intend availing themselves of this opportunity to receive a practical insight into this branch of agriculture, are requested to make early application.

REPORTS AND NOTICES FROM BRANCHES.

Cardiff.

A demonstration of "Summer Pruning" was given by Mr. J G. R. Bryant, Assistant Fruit Expert, on 24th November, when there was a good attendance of fruitgrowers. At the conclusion of the demonstration Mr. Bryant inspected a number of orchards in the district.

Carlingford.

At the last meeting of this branch, a lecture was delivered by Mr. Henry Lord, Lecturer in Agriculture at the Technical College, on the subject of "Breeding, from a farmer's point of view, as applied to horses, cattle, poultry, &c."

Mr. Lord explained very fully the Mendelian laws of heredity, and gave numerous illustrations of their operation in the case of animals and plants.

Mr. Lord also outlined, with the aid of diagrams, the principles of line breeding, and referred to the possibility of controlling sex in breeding.

Gerringong.

A very successful demonstration of clearing, subsoiling, and log-splitting with explosives was given at Gerringong on 14th November by Mr. H. C. Coggins, over fifty farmers and other interested persons being present.

A blue gum stump of about 3 feet diameter was selected, four holes were bored under the stump, and a sufficient quantity of gelignite rammed into each hole. While the work was in progress Mr. Coggins explained thoroughly how to use the gelignite, and gave instructions in clearing and subsoiling generally. The charge being ready the wires were connected to the cable, which was run out to a considerable distance, where the electric battery was attached, and on the current being switched on the stump was completely removed, as the accompanying illustration shows.

The log selected for the splitting demonstration was a rejected blue-gum fork, in which two shots were put and fired by fuses, the result again being satisfactory.

Mr. Coggins also did some subsoiling, but he contended that the Gerringong flats did not require subsoiling unless a hard pan had been caused by continually ploughing to the same depth. This demonstration also showed the usefulness of explosives where holes had to be trenched when laying out a new orchard, or where fencing had to be done in hard ground.

A vote of thanks was accorded Mr. Coggins, those present feeling well pleased at the effective work which had been so economically done.

Inverell.

At the monthly meeting of this branch, held on 14th Novemoer, Mr. E. C. Sommerlad read a paper on "Co-operation."

Co-operation.

So far as the trend of modern social and industrial life can be gauged, it is clear that the ultimate solution of things will lie in the universal adoption of the co-operative principle, or something akin to it. The iron-bound domination of Capital in the past, and the unthinking ascendancy of organised Labour in the present, are alike extremes that cannot remain. The industrial pendulum that has swung clear from one point to its opposite, must ultimately find repose in some middle position. And so far as present indications go, that middle position will be in the co-operative movement. The growing spirit of equality among men and the desire to have more than a wage-earner's share in the result of one's labour, will make a recurrence of the old order of things forever impossible. Co-operation, however, makes a strong appeal to self-interest without being in itself selfish, and without giving one member a chance to lord it over his fellows. All stand on the same plane and all have equal rights. It is not a class movement, nor a secular movement, nor a political movement. It is unique in that it gives each member a sense of personal responsibility makes him feel he has a part to play in the scheme of things, and that any failure to play that part must by so much weaken the whole. Co-operation makes a man his own master, gives him a voice in the management of the business in which he is engaged, and so tends to draw out the best that is in him. Co-operation is more than a system of profit making; it is a system of character-building as well, because of the direct personal appeal it makes to each of its members. It is because it has its foundation on this eternal principle in human nature, that the eyes of the thinking world are looking to the co-operative movement as the way of social and industrial salvation.

This very general introduction is purposely given in order to expand our ideas as to the scope and possibilities of the movement. We are inclined to limit the range of co-operation to what we have ourselves experienced, which in most cases means the running of a co-operative butter factory or something of the kind. But when in 1844, after many failures and setbacks, the Rochdale Pioneers opened the first co-operative store with a capital of £28, they unconsciously stumbled upon what is destined to become one of the great world-movements of our time.

While it is true that co-operation is only in its beginning in Australia (a very healthy beginning nevertheless), its growth in the old world has been little short of phenomenal. Last August, the Ninth Annual International Co-operative Alliance met in Glasgow, when there were 600 delegates, representing over 20 million members of 130,000 societies in the twenty-four nations incorporated in the Alliance. From the opening of the first co-operative store in Denmark by Rev. Mr. Sonne in 1866, the movement has spread until four-fifths of the people of that country are now embraced. It is to co-operation solely that Denmark owes her world-wide eminence in dairy products. Co-operation has very largely turned Denmark into a land of small and profitable holdings. It has also been responsible for a great educational uplift among the people—so much so, in fact, that an authority says: "The Danish peasant farmers are about to reach a standard of intelligence without parallel in any of the countries of Europe." Beginning among the peasant farmers, it now includes a great number of the landed proprietors of the nation.

About one-fourth of the people of the United Kingdom are co-operators; Germany has some 30,000 societies; Russia over 14,000, and Japan about the same number; while in the United States and Canada every branch of the movement is progressing.

A Demonstration in the use of Explosives at Gerringong.

Photos by C. T. Hindmarsh, Gerringong.

Incidentally, it is interesting to note that a Commission appointed by the United States Government, declared after investigation, that co-operation was one of the biggest factors in keeping down the cost of living.

These figures, which could be amplified to almost any extent from practically all the nations of the world, will serve to indicate something of the hold the co-operative movement already has.

In Germany a credit bank on co-operative lines has been established, having some 17,000 branches. This bank is true to the ideal of co-operation in that it makes character, and character only, the basis of its banking security. Some striking instances of the moral transformation of whole villages in Germany by the introduction of the co-operative bank are on record.

In Australia, while co-operation has been successfully applied to many departments of industry, it has achieved its greatest success in the manufacture of dairy products. In New South Wales alone there are at present some seventy co-operative butter factories, which are responsible for 75 per cent. of the State's output of that commodity. Several wholesale co-operative federations are also in existence for the disposal of practically all kinds of farm produce. The most successful of these is the Coastal Farmers' Co-operative Society, Limited, which last year had a turnover of £1,350,000, and returned in bonuses to its suppliers £11,000.

In spite of this, however, there yet remains an enormous scope in Australia for the successful application of the various forms of agricultural co-operation. In the first place, some form of co-partnership could profitably be employed by farmers and primary producers generally, that would go largely to settle the farm labour problem. In some form, the rural workers' claims will have to be faced by farmers before long, and will either result in the crippling of the farmer or the crippling of his industry. In this connection it is very much open to question whether some system by which the permanent employee could be given a financial interest in his work would not achieve the desired result without any friction, and produce an infinitely better type of farm labourer into the bargain. Another form of co-operation that could be more largely adopted is that by which the cost of expensive labour-saving machinery could be borne by farmers co-operatively, thus giving to all alike the benefit of the best and cheapest means of production at a modicum of cost. In America, telephones are erected in this way, while all kinds of expensive machinery are made available to shareholders. The same applies to the use of good stud stock, such as would be beyond the means of the average farmer to buy.

Then there is room for development in the matter of secondary production. It is surely safe to argue that what can be done in the dairying industry can be done in many another. If a butter factory can be run co-operatively to deal with a farmer's milk, why not other factories to deal with other products?

There is also abundant scope in the disposal of primary and secondary products, and it is perhaps here more than anywhere else that the need for co-operation exists. The principle stands for the elimination of every unnecessary middleman. The vital interests of society call for his removal, and co-operation shows how he can be removed. The principle of co-operation requires that the services of every necessary middleman shall be adequately remunerated, but it also requires that every unnecessary toll taken from an article on its way from the producer to the consumer shall be removed. Immense success has attended the application of co-operation to the sale of fruit in California and other American States, and systematic organisation on the part of growers would enable them to have a bigger say in determining the prices their products should bring. One has only to spend a day in one of the big fruit markets in Sydney or Brisbane to be impressed with the need for organisation on the part of the producers, who, after spending money and time, and bestowing a deal of skill in bringing their merchandise to a marketable stage, then commit it confidingly to a system of exchange that has within it the possibilities of infinite abuse. The co-operative sale of eggs, for instance, has already been most successfully tried by the management of the Balaclava Co-operative Butter Company in Victoria.

What applies to the sale of the farmer's goods applies in great degree to the purchase of necessary commodities. The co-operative purchasing of all sorts of farm requirements, even down to bulk groceries and footwear, has been most successfully carried on at Balaclava and other places in both Victoria and South Australia. Absolutely no credit is given, and the very minimum cost is incurred in the exchange of goods. After paying expenses, any balance over working capital is returned to the co-operators and makes a very appreciable discount indeed.

The movement is not of the nature of a trust or combine, or any such exclusive organisation. On the contrary, co-operation in its free and natural course, offers the most practical and effective safeguard that can be obtained against the possible tyranny

of trusts and organised minorities generally. It is safe to say that by the substitution of systematized distribution for unorganised distribution, of co-operative buying for individual buying, and co-operative marketing for individual selling, the wants of both producer and consumer can be met more effectively and at less cost.

There are yet many aspects that could be touched upon, but enough has been said to stimulate thought. A word is necessary before closing, however, on the essentials to success in all co-operative effort. Allowing that initial capital is sufficient and that management is competent, the one thing that remains is for the members to be unswervingly loyal. Disloyalty is a canker that eats out the heart of the movement, and, unfortunately, it is the most prevalent evil. Most organisations have been affected to a greater or less degree—even the great Byron Bay Co-operative Company, which has led the way in co-operative bacon-curing, has been regularly obliged to complain of its members selling their pigs to competitive buyers for a trifling advantage. The local bacon factory unfortunately is in the same position to-day; and, while I hold no brief for the company and have no personal interest in it, I cannot refrain from saying that the action of growers in selling to outside companies is short-sighted and improper. If producers realised that the private buyer has to make his profit out of the farmer while the farmer could make that profit for himself in his own factory, they would think twice of grasping at the small immediate inducement offered. In some co-operative factories a penal bond is included in the shares, by which the shareholder is penalised in a given sum for every pig sold outside his own company. While this has often proved effective, it is a thousand pities that men cannot be induced to stand together voluntarily for their own good, and the protection of their own interests against the encroachments of others.

Mr. SWEANEY said he had listened with great interest and appreciation to the paper. He felt that co-operation, as it should be, must be to the benefit of those participating. Strange to say, the people who most needed to co-operate—the primary producers—were those who were least disposed to do so. Co-operation had lifted the dairying industry in Australia out of the mire to the place it occupied to day; and if the principle were applied to other industries in the same way, what a happy position they would be in! The difficulty was to successfully initiate a co-operative concern. Vested interests generally made it a point to offer a higher price than the co-operative concern, and the farmer, who could not see beyond his nose, accepted the proffered inducement. He did not realise that when his own co-operation was built up, it would be paramount. He was impressed with the idea of introducing good stud stock co-operatively. It was only the exceptional man who could do it himself, while the introduction of such stock would immensely improve the quality and value of the herds of any district.

Mr. DITZELL touched on the references to the benefits of co-operation in Denmark and California, in which two places it had entirely raised the status of the man on the land In Australia co-operation could be worked among farmers so as to effect a big saving in many ways. They could have a voice in the selling of their produce—they could hold the key of the situation in their own hands. If produce could not be sold in Australia at satisfactory prices they need not give it away, but could export the surplus.

Mr. Ditzell moved a hearty vote of thanks to Mr. Sommerlad for his paper, which he considered the ablest yet read at any of their meetings. He had given them much food for thought, and he felt that the matter could be profitably discussed at a later meeting, when the farmers had had time to digest what had been said.

The motion was seconded and cordially agreed to.

Katoomba.

At a meeting of members of the above branch at Mrs. Hislop's bee farm, a practical demonstration in apiculture was given by Mr. R. G. Warry, a goodly number being present. On this occasion Mr. Warry, having the bees before him, and being able to handle the sections with the bees attached and working, could explain their various functions—queen bee, drones, and workers all being located. The new methods of obtaining honey, especially with the improved Bolton hive, and a practical idea for excluding ants, were satisfactorily explained.

Lower Portland.

At the usual monthly meeting of this branch on 22nd November, Mr. L. Herps read the following paper :—

FRUIT GROWING.

In planting an orchard, the first thing is to get as good a site as possible—preferably one sheltered from the wind, and (if not naturally drained) soakage drains must be made; otherwise it would be waste of time and labour to plant the trees, for in wet seasons a great many, if not all the trees, would die of "bark rot."

Light loamy soils are the best for all kinds of stone fruit, but pears and apples require richer soil, though even with these it is not wise to have the soil too strong, as pears are more subject to black spot in heavy soil, and the fruit is not so early, and does not have so good a colour as when grown on medium soil.

Before planting the young trees the land should be in good order. The holes for the planting should be from 12 to 18 inches deep, and in the bottom of each hole there should be a little mound, on which the tree can be placed, the roots being bent downwards. The earth is then carefully placed round the roots and trodden down, leaving sufficient loose soil on top to prevent a crust forming. The usual distance for planting is from 20 to 22 feet; but apricots and pears should be given more room, as they are very vigorous growers.

There is no need to stake young trees, unless the barrels are crooked. The stake is no protection, and, indeed, it is rather a danger to the tree, for when working, if the swingletree or the trace hook happened to catch on the stake, it would be liable to drag the lot out, or to greatly damage the tree, while if a limb of the tree was caught, the limb would give, and the tree would not be damaged nearly so much. If the time spent in cutting stakes were spent in the planting, there would be no danger of any wind blowing the trees over.

Young trees do not bear sufficient fruit to pay for the working for the first two or three years, and unless the soil is very poor, different kinds of crops can be grown between the rows for the first year or two, without affecting the growth of the trees. The trees should be well watched in summer, and all shoots rubbed off the barrels and lower limbs. The shoots are very easily rubbed off when young, but if left, a lot of the strength goes into them, instead of the tree, and more pruning is also required. The amount of pruning required depends a great deal on the soil, and also on the kind of tree, some sorts not needing nearly so much pruning as others.

The early fruit is generally the most profitable. The "Ezzy" apricot is one of the first to ripen, and the "Newcastle" and "Pennant Hill" are also early. "Pennant Hill" is, as a rule, a shy bearer, but as the apricots bring such good prices, a light crop pays. Nearly any sort of plum does well in this district; black plums, such as Early Evans, Tibbet's Seedling, "Black Bully," Lutherborough, and Angelina Burdett always sell at paying prices. Some of the best peaches are Briggs' Red May, Arkansas Traveller, Ruby Red, Early Crawford, Elberta, Royal George, Powell's Beauty, Globe, Chair's Choice, and many others. These find a ready market. Most varieties of pears and apples do well in this district, but a cool climate suits them better.

On 17th January, Mr. J. Hadlington, Poultry Expert, gave a lecture to the members of this branch.

POULTRY FARMING IN COMBINATION WITH AGRICULTURE.

The lecturer reviewed what appeared to him to be the special local conditions, and advised the combination of poultry, as a side line, with agriculture and horticulture. Under these conditions it appeared to him that running fowls in fairly large batches on "free range" would be likely to give better results than more intensive methods. The latter was more practicable when poultry-farming was adopted as a business by itself. Free range conditions, too, would give better hatching results with a minimum of work, although the system might at times have its drawbacks with orchard work, and also in consequence of the depredations of foxes and other animals.

The lecturer then went on to show how to meet these drawbacks by constructing small yards in connection with the free range colony houses, that could on occasion, when desirable, be used to confine the fowls during periods when soft fruit was ripening or at night. Where timber was scarce the use of 3 in. x 1 in. battens, with a short piece of same nailed on the bottom to go in the ground, was recommended for posts. This would be found quite substantial, and would last a number of years. The best wire-netting to use was 6-ft., as, under ordinary conditions, it was fox-proof. Confining fowls to small enclosures meant very close attention to their requirements and

extreme cleanliness. This was almost out of the question with people having large interests to attend to.

Questioned by Mr. Lowe as to the part played by the egg itself in the poor hatching results of the past two seasons, the lecturer went on to explain that lowered vitality of the parent stock was, in his opinion, the greatest factor It should be remembered that July and part of August in each of the two seasons referred to were almost continuously wet. In his experience much wet weather in these months was always the forerunner of a poor hatching season. These poor hatchings were not necessarily the result of poor fertilisation, although that might be a contributing cause; but, in his opinion, the constituents of the egg itself was a main factor. Therein lay the whole cause of chicks being found dead in the shell—always, of course, provided the incubating conditions were good. The trouble might be summed up in one word—weakness.

Another question turned the discussion to the chickens becoming fully developed in the shell and then failing to hatch, through what the questioner regarded as drying out of the moisture and toughening of the membrane. The lecturer explained that this was not the real cause; the weak chickens took too long to get out of the shell, and the real cause must be looked for in the answer to the previous question.

Many views showing the types of the various breeds of fowls were shown and explained, demonstrating that birds for show purposes were not necessarily the best for egg-production. The breeds recommended for utility purposes were Orpington, Leghorn, Wyandotte, and others.

Much interest was manifested in the subjects dealt with, and many questions were answered. At the conclusion, a vote of thanks was accorded to Mr. Hadlington for his very instructive lecture, and to the Department for his services.

Middle Dural.

Mr. J. G. R. Bryant, Assistant Fruit Expert, visited Middle Dural on 7th January, and inspected a number of orchards, afterwards delivering a lecture on "Pruning, Grafting, and Budding." The members showed a keen interest in Mr. Bryant's address, and much appreciated his visit.

Narellan.

A new branch has been formed at Narellan, with twenty-seven members to commence, the subscription being fixed at 2s. 6d. per annum. The office-bearers are as follow:—Chairman, Mr. E. Cross; Vice-Chairman, Mr. D. Nott; Treasurer, Mr. S. M. Smith; Hon. Secretary, Mr. G. J. Richardson, all of Narellan.

Orangeville.

The annual meeting of this branch took place on 7th January, when the following office-bearers were elected for the ensuing year:—Chairman, Mr. W. J. Moulder; Vice-Chairmen, Messrs. R. H. Taylor and J. Petrie; Hon. Treasurer, Mr. A. McWhirter; Hon. Secretary, Mr. C. Duck.

Orchard Hills.

The President of this branch, Mr. C. Bloomfield, read a paper at the meeting held on 8th December.

Wheat Growing in the West.

The first essential in wheat farming is to look for a suitable piece of land in a suitable locality, where there is a fair average rainfall, and where there is railway communication within a reasonable distance, say within 15 miles, but the closer the better. My experience is that it is better for a farmer to pay a fair price for land close to a railway station or siding, than to obtain land at a low price situated a long distance away from this means of communication, for the cost of getting the produce to market may eat up all the profits. Of course, if a man takes up virgin soil he must clear that land and get it ready for the plough. If his means are limited, and he wishes to get a

quick return, it may be advisable to go in for what is called Yankee grubbing,—that is to say, he grubs all the small timber out and cuts the large trees down just under the surface of the ground, and then uses stump-jump machinery. But if means will permit, I would advise taking everything out to a depth of not less than 6 inches, for otherwise, the land cannot be thoroughly cultivated, and the stumps will always be a source of trouble and annoyance, not only breaking implements, but often causing sore shoulders on the horses and inconveniencing the farmer in many other ways. On the other hand, if he thoroughly clears his land, it is done with for all time. There is another way in which a man with limited means may make a start on a new farm and get a quick return, and I think it is preferable to Yankee grubbing. The process is as follows :—Grub out all the small timber, and thin out the balance, so that you can get through the remainder with the plough team, then ringbark what are left. This "ringing" should be done right through the sap into the redwood, for the tree will then die in a very short time ; in fact, the leaves will begin to wither in the course of twelve hours. After burning off all the light timber, you can plough through the trees and sow the crop, feeling pretty sure of getting a fair return. I have seen as high as 30 bushels to the acre taken off land treated in this way in the Molong district, where I first saw this method of treating the land. This is called the "Boardman method," having been derived from the name of the man who commenced farming in this way, and who made a great success of it. He did not continue on this primitive system, but gradually got his farm thoroughly well grubbed. There is another point in regard to the foregoing method—after the trees have been ringbarked for a few years, they are more easily grubbed and burnt off than they would be if they were green. Having got the land in order, I should recommend getting a few sheep, and adopting a system of mixed farming Sheep are almost indispensable to the wheat farmer. They are the best scavengers I know of. They keep the weeds down on the cultivation, help to fertilise it, and also supply good, wholesome meat for the table, and the wool cheque comes in very handy to help pay expenses at harvest time. I would advise going in for rotation crops and fallowing. There are two kinds of fallow, the "short," or "summer fallow," and the "long" fallow. The short fallow means that as soon as the crop is harvested the farmer at once, or as soon as possible, puts the plough into the land, in order to get the benefit of all the summer rains ; then, as soon as he can get on to the land after the rain, he harrows it down so as to conserve every possible drop of moisture. The weeds will then begin to start, and this is where the sheep come in. Turn them on to the fallow land, and they will keep weeds down, thus saving a good deal of l-' our. Avoid putting sheep on if the ground is wet or boggy ; wait till it dries sufficiently. If the surface begins to cake and get hard, put the cultivator on, and keep the fallow worked in this way till seed time. The long fallow is, in principle, similar to the short fallow. As soon as seeding operations are completed, and while the horses are in good fettle, which they should be after the seeding is finished, plough all spare land for fallow for next year's crop, and keep it cultivated as with the short fallow. By this means the land is kept in good heart and in good condition to receive the seed, which ensures the germination of the seed, and in all probability a fair crop. I have never experienced a failure on land treated in this way.

It is a bad plan to sow wheat after wheat on the same land, as the land gets what is known as "wheat sick," and the crop is rendered more liable to diseases, such as bunt and take-all. The latter is a disease that is very prevalent in all wheat-growing districts. The wheat, after it comes into head, dies off in patches before the grain fills, there being no apparent cause. The real cause is continuously sowing wheat on the same land year after year, and the only remedy is rotation of crops and fallow.

There is another point in wheat farming which must not be neglected if success is to be achieved ; that is, secure the best and cleanest seed possible, and always varieties suitable to the district. I would advise every farmer to obtain a grader, and grade all his seed wheat so as to take all foreign matter out of it, for it is very easy to foul land, but it takes years to get it clean again. I would advise planting nothing but the cleanest of seed procurable. A large rainfall is not essential to a good crop of wheat ; in fact, I prefer a medium rainfall. For example, I have grown, in the Trundle district, a 15-bushel crop on 656 points of rain during the growing season.

Penrose-Kareela.

The usual monthly meeting of this branch was held on 20th December, when it was decided to arrange for an exhibit of fruit from the district at the forthcoming R.A.S. Show.

Arrangements are being made for an early demonstration in packing fruit by Mr. J. G. R. Bryant, Assistant Fruit Expert.

Sherwood.

Mr. J. G. R. Bryant, Assistant Fruit Expert, will visit Sherwood on 9th March and inspect local orchards.

Taralga.

Mr. J. W. Mathews, Sheep and Wool Expert, gave a lecture to members of the above branch on the 25th November. The cross recommended by Mr. Mathews for the district was the Lincoln-Merino. He considered it the best dual-purpose sheep. Wrinkly, black-tipped Merinos came in for severe criticism, their disadvantages being clearly and forcibly shown.

Uralla.

A lecture on the use of explosives in agriculture was given by Mr. H. C. Coggins, on Messrs. Neil and Buchanan's farm, on the 10th December, before a good attendance of farmers. Mr. Coggins practically demonstrated the value of explosives to the man on the land by blowing out a large tree and a green stump, at a very small cost. The subsoiling demonstration had great interest for the orchardist, and keen attention was paid to the operation.

Wollun.

The monthly meeting of this branch took place on 13th December, when there was a good attendance of members, Mr. T. C. Burnell (President) being in the chair.

The President drew attention to the recent visit of the Assistant Sheep and Wool Expert (Mr. H. S. Major), and invited discussion on the ideas given by that officer in the methods of preparation of clip.

A short impromptu discussion on the types of Merino suitable for the district, which was introduced by Mr. Stuart Burnell, brought out much valuable information on the much-discussed problem of the acclimatising of Merino sheep introduced from other localities. It was the experience of those who had tried these importations that breeding by local selection was undoubtedly the safest method.

The President drew attention to the present seriousness of the grasshopper pest, and thought it was high time concerted action was taken to reduce it.

Mr. C. E. Burke stated that he had studied their methods of breeding, and in the Western and North-western districts of the State these breeding spots or "patches" were easily noticeable at varying times of the year according to the season. He thought if a proper and regular system of spraying was introduced, the pest could be lessened.

Wolseley Park.

During the last week of November, Mr. H. S. Major, Assistant Sheep and Wool Expert, was in the Wolseley Park, Tumberumba, district, and shearing being in progress, many sheds were visited in order to give information

and practical demonstrations on the preparation of small wool clips for market.

IMPROVEMENTS IN PASTORAL METHODS.

In order that some of the members living in the more remote parts might be reached, a demonstration was held on a Saturday afternoon at the Carboona woolshed, where, with the wool in the shed, practical illustrations were given as to the classing of Merino and cross-bred wool, rolling and skirting of fleeces, piece-picking, and the packing of wool.

As regards the breeding of sheep, it was evident that small flock-owners were awakening to the advantages of using better rams, and were also making some selection of their maiden ewes.

Some farmers who possess more level country have sown down lucerne, sheeps' burnet, and different grass mixtures. At the Wolseley Park estate, Mr. A. J. Rial puts some new ground under crop nearly every year, after which grasses are sown. In these cold elevated districts of New South Wales, where the rainfall is high, this practice might be more general, as the carrying capacity of the land can be greatly increased. The railway now in course of construction from Wagga to Tumberumba will, when completed, bring about great changes in the Wolseley Park district. During times of drought in Eastern Riverina sheep can be conveyed very quickly to the mountain country, and though most of the landowners graze Merino sheep, much of the country is very suitable for breeding and fattening cross-breeds.

TAGASASTE (*Cytisus proliferus* var. *albus*).

THE following extract from a recent number of the *Kew Bulletin* will interest many people in New South Wales :—

The well-known fodder plant Tagasaste (*Cytisus proliferus*) was extensively cultivated on the lower slopes (see *Kew Bulletin*, 1891, 239 ; 1893, 115). It should be treated like an osier, *i.e.*, cut back regularly, so as to produce plenty of young shoots, and at the same time prevent it growing into a tree. The low growth is the result of pruning, and not a varietal character as supposed by Schroter (*Nach den Canarischen Inseln*, p. 65). The comparative failure of Tagasaste as a fodder plant in the colonies is attributed by Dr. Perez to improper treatment, the bushes being allowed to become arborescent. Horses generally refuse it at first, but can easily be taught to like it. (A Botanical Expedition to the Canary Islands, 1913, by T. A. Sprague and J. Hutchinson, in *Kew Bulletin*, No. 8, 1913, p. 219.)

I need scarcely say that the growth of fodder plants suitable for the drier parts of New South Wales is one of the most important problems for us.

Reports from farmers and others in regard to this fodder plant, which is so much esteemed in its native country, have stated either that it is not sufficiently drought-resistant for the conditions that obtain in many parts of western New South Wales, or that stock will not eat it.

I have had a good deal of correspondence during the last few years with the Dr. Perez referred to in the paragraph, who is a most distinguished man, and what he says is worthy of being treated with respect.

I have often seen the Tagasaste treated as a tall hedge, or a single shrub or small tree rarely touched with the shears. It would be desirable for people systematically to develop the young shoots frequently, and feed them to horses and cattle. It is worth while persevering with it. I am quite aware that some people have already found it to be a success, but I believe that its nutritious and drought-resisting qualities are not taken sufficient advantage of.—J. H. MAIDEN.

Orchard Notes.

W. J. ALLEN.

FEBRUARY.

OWING to the continued dry weather many of the trees in our coastal districts are looking very bad, particularly the old citrus trees, the majority of which are carrying little, if any, fruit; the younger trees, however, are in many cases carrying a nice show.

The grape crop is one of the best for years, despite the dry weather. The greater attention that is being given to cultivation and manuring is, no doubt, responsible for this pleasant state of affairs. The apple crop is somewhat disappointing; peaches are very poor; whilst apricots and plums are fair. Taking the season right through it is one of the lightest crops harvested for many years.

Orchards in the county of Cumberland are feeling the effects of the continued dry spell, especially those situated on shallow soil, and those which have not received attention in the way of ploughing, cultivation, and manuring. It is evident that many an orchard in this State is slowly starving to death, owing to the want of a little care and foresight on the part of the owner, who, so long as he allows his orchard to remain in this unsatisfactory condition, will continue to blame anything and everything but himself.

Poor, worn-out soil usually sets hard and dries out quickly, while soil kept in good condition by a proper system of manuring is loose and friable, holding the moisture better, and is in every way in better condition for withstanding the continued dry spells so frequently experienced during the summer months.

Scale Insects.

The various scales, including white louse, should be treated either by fumigation or sprayed with special resin and soda wash. Leaflets on the formulas used may be had free upon application to the Department. The work should not be carried out in the hot part of the day, or upon trees in weak condition.

Citrus trees sprayed with lime and sulphur solution for black spot and other fungus diseases, will be benefited at this season. This spray is an insecticide as well as a fungicide.

Codlin Moth.

A careful look-out for codlin moth should still be kept. Bandages placed around the stems at the present time will act as a source of harbour for the grubs, and will pay for the trouble of putting on so long as they are regularly inspected and the larvæ destroyed. All infected fruit should also be carefully destroyed.

Fruit Fly.

All fly-infested fruit should be picked up and burnt. Kerosene traps placed on the sunny side of the trees are a splendid means of catching the adult flies.

Irrigation.

Where irrigation is practised, see that the trees and vines are given a good watering if they require it. In most cases during normal seasons vines should not need any further watering, as in the case of raisin grapes it would retard the ripening period, which is precisely what we wish to hasten. It may help dessert varieties intended for marketing late in the fall or early winter. It should be borne in mind that where trees or vines are watered, the land should be thoroughly cultivated immediately it is dry enough to work.

Harvesting Fruits.

Handling and harvesting of fruits will still be continued. Fruit intended for export will be ready for picking towards the end of this month. For export, only the best quality fruit should be forwarded. It should be well coloured, of good size, evenly graded, neatly wrapped and firmly packed. The fruit should be picked in the cool part of the day, and handled carefully to avoid bruising.

Drying of Fruit.

This operation will be in full swing this month. The Department issues a Bulletin detailing the various operations. The raisin grape, sultana, and prune all require to be dipped as soon as possible after picking, and before they have been placed on the trays to dry.

Reworking trees.

The present month is a most suitable time for reworking unprofitable and unsuitable varieties of fruit trees. The work should be conducted in the cool part of the day, so that the buds will not dry out. Buds should be selected from trees of proved bearing qualities. The sap needs to be full so that the bark lifts readily.

Green Manuring.

Towards the end of the month arrangements should be made for sowing crops for green manuring, and as the fall and winter are the only seasons when such crops can be grown among the trees without robbing them of moisture, it is best to sow only such varieties as will make a fair growth during the cooler months. Field peas, vetches, Skinless barley, rape, and black winter rye are all suitable crops for the purpose of green manuring. Such crops as grey field peas and vetches are depended on to furnish nitrogen and organic matter to keep the soil in a high state of fertility.

Acknowledgments.

I have to acknowledge, with thanks, the receipt of some very fine specimens of apples and plums from Mr. F. Mason, Beecroft, also some fine specimens of apples from Messrs. T. Jones and T. Joliff, Darke's Forest.

A sample of St. Margaret cherries has arrived in excellent condition from Mr. J. H. Yeoman of Green Hill, Uralla, who intimated that he always followed the advice given in the *Gazette*, *re* cultivating after every shower. The quality of the fruit was first class, and served to show the suitability of the soil and climate for cherry culture.

Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull.	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn ..	Imperialist ...	Florio	Lady Nancy of Minembah.	Berry Farm ...	*
Jersey ..	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Cowra Farm ...	*
" ...	Thessalian II. ..	Thessalian (imp.).	Egyptian Princess (imp.).	Wagga Farm ..	*
" ...	Xmas Fox (imp.)	Silver Fox ...	Malvoisie ..	Wagga Farm ...	*
" ...	Trafalgar ...	Best Man ...	Rum Omelette	Wagga Farm ...	*
" ...	Kaid of Khartoum	Sir Jack ...	Egyptian Belle	H. A. College ..	*
" ...	Bridegroom ..	Best Man ...	Golden Omelette	Yanco Farm ..	
Guernsey ..	The King's Mirror	Calm Prince ...	Vivid (imp.) ..	Kyogle	30 June, '14.
" ...	Star Prince ...	Calm Prince ...	Vivid (imp.)...	"	5 Mar., '14.
" ...	Sky Pilot ...	Prince Souvia ...	Parson's Red Rose (imp.).	Macleau	11 July, '14.
" ..	Prince Souvia ...	Vivid's Prince..	Souvenir (imp.)	Wollongbar Farm	*
" ...	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (6509)	Inverell	5 April, '14.
" ...	Sunshine ...	King of the Roses	Princess Vivid	Grafton	15 Feb., '14.
" ...	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	*
" ...	Claudius (imp.)	Golden Star II..	Claudia's Pride (imp.).	Tweed River ...	18 Feb., '14
" ...	Trengwainton Village Favourite (imp.)	Trengwainton Village Lad.	Wild Eyes ...	Wollongbar Farm	*
" ...	George III ...	King of the Roses	Calm 2nd ...	Berry Farm ...	20 Feb., '14.
" ...	The Peacemaker	Calm Prince ...	Rose Petersen	Scone	2 July, '14.
" ...	King of the Roses	Hayes' King ...	Rosey 8th (im.)	Bega	20 June, '14.
" ...	Lauderlad ...	Laura's Boy ..	Souvenir of Wollongbar	Kyogle	3 Mar., '14.
" ...	Belfast	King of the Roses	Flaxy 2nd ...	South Grafton ...	— Mar., '14.
" ...	Royal Preel ...	Itchen Royal ...	Hayes' Lily du Preel (imp.).	Murwillumbah ..	9 May, '14.
" ..	Prince of Warren Wood (imp.).	Kingsmoor Governor (1952)	Quail (7051)	Macleay River ...	8 Feb., '14.
" ..	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Fredericton ...	20 Mar., '14.
" ...	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	H.A. College, Richmond	†
Ayrshire ..	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose..	Grafton Farm ..	*
" ...	Orphan Boy ..	Songster of Greystanes.	Rosamond ..	Glen Innes Farm..	*
" ...	Wyllieland Bright Lad (imp.)	Wyllieland Gleniffer (7229)	Wyllieland Sangie	H.A. College, Richmond	*
Kerry... ..	Bratha's Boy ...	Aicme Chin (imp.)	Bratha 4th ..	" "	†
"	Rising Sun ...	Bratha's Boy ..	Dawn ..	Bathurst Farm ...	*

* Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed.

Department of Agriculture,
Sydney, 2nd February, 1914.

BULLS FOR SALE

AT BERRY EXPERIMENT FARM.

GUERNSEYS.—Lassie's Favourite: sire, Trengwainton Village Favourite (imp.); dam, Rohais Lassie 2nd; calved 14th June, 1912. Price, **£30.**
Rohais Lassie (imp.), dam of Rohais Lassie 2nd, gave 331 lb. butter in 42 weeks.

Four-leaf Shamrock: sire, Calm Prince; dam, Shamrock of Les Vesquesses (imp.); calved 26th November, 1912. Price, **£30.**
The dam of this bull gave 285 lb butter in 41 weeks.

King of the Preel: sire, Trengwainton Village Favourite (imp.); dam, Flower of the Preel 3rd (imp.); calved 31st December, 1912. Price, **£30.**
The dam of this bull gave 332 lb. butter in 40 weeks.

JERSEYS.—Foxhunter (539): sire, Xmas Fox (imp.); dam, Egypt's Glory; calved 22nd March, 1912. Price, **£20.**

Irish Fox (565): sire, Xmas Fox (imp.); dam, Pattibelle; calved 26th July, 1912. Price, **£15.**

Full Cry (546): sire, Xmas Fox (imp.); dam, Calceolus; calved 16th April, 1912. Price, **£20.**

SHORTHORNS.—Lloyd George (561): sire, Imperialist; dam, Dora; calved 5th July, 1912. Price, **£15.**
Milk yield of dam: 7,868 lb in a season; butter, 342 lb. in a season.

HOLSTEIN.—Colonel Neitenstein (355): sire, Neitenstein; dam, Marjorie; calved 26th April, 1912. Price, **£20.**

AT COWRA EXPERIMENT FARM.

JERSEY.—Fresh Gold: calved 12th June, 1912; colour, whole; sire, Old Gold; dam, Lady Colleen 2nd (A.J.H.B.). Price, **£12 12s.**
Lady Colleen 2nd is by Golden Pride from Lady Colleen (488, A.J.H.B.).
Lady Colleen (488) is by Golden Lord (39, A.J.H.B.), from Billie (18, A.J.H.B.).

AT GLEN INNES EXPERIMENT FARM.

AYRSHIRES.—The Poet: calved 17th February, 1912. Sire, Byron; dam, Scotch Heather, by Jamie's Ayr; g d, Leaf Bud, by Prince Emerald (imp.); g g d, Rose Berry, by Mischief Maker of Barcheskie (imp.), 3,892. Price, **£10.**

Byron's Boy: calved 3rd March, 1912. Sire, Byron; dam, Hattie Craig, by Daniel of Auchenbrain (imp.); g d, Juliette, by Mischief Maker of Barcheskie (imp.), 3,892; g g d, Judy IX of Barcheskie (imp.), 11,832, by Traveller of Drumjoan, 1,441. Price, **£10.**

Bright Boy: calved 8th November, 1912. Sire, Wyllieland Bright Lad (imp.); dam, Moonstone, by Emerald's Mischief; g d, pure Ayrshire Cow, No. 163, Hawkesbury Agricultural College Register. Price, **£5 5s.**

BULLS FOR SALE—*continued.*

AT WOLLONGBAR EXPERIMENT FARM

JERSEY.—Royal Blood (473): sire, Berry Melbourne; dam, Calceolus; calved 26th February, 1911. Price, **£30.**

AT GRAFTON EXPERIMENT FARM.

AYRSHIRE.—Jamie's Heir: sire, Jamie of Oakleaf; dam, Miss Prim; calved 25th July, 1905; colour, white and brown. Price, **£50.**

AT HAWKESBURY AGRICULTURAL COLLEGE.

AYRSHIRE.—Patriot: sire, Byron; dam, Primrose II; age, 18 months; colour, red and white. Price, **£15 15s.**

KERRY.—Kildare II (imp.): dam, Belvedare Bratha III (imp.); calved 25th August, 1905; colour, black. Price, **£18.**

GEORGE VALDER, Acting Under Secretary, and
Director of Agriculture.

FATTENING SHEEP ON TURNIPS.

A CORRESPONDENT asks what quantity of turnips is required to fatten a sheep in fair store condition, and also the yield of Swede turnips under irrigation.

In reply, Mr. J. Wrenford Mathews stated that it is difficult to say how many turnips it would take to fatten one sheep, for the simple reason that, as a rule, farmers do not fatten sheep on turnips alone, but generally combine them with some other fodder, even if it is only pasture. In New Zealand, the practice is, when threshing oat crops, to put some stacks of straw in the paddocks where the turnips are to be grown, so that the sheep may be supplied with the dry straw at the time they are feeding on the turnips. Other farmers also arrange to feed either oaten or wheaten chaff in the paddocks, at the same time as the turnips are being fed to the sheep. The mixed fodder is of far more value to sheep than any one fodder alone. Feeding turnips alone is really a bad practice.

An average crop of turnips under the conditions stated should produce at least 15 tons per acre. A sheep would eat from 5 to 6 lb. of turnips per day, and on this estimate twelve sheep would consume about 1 ton per month. Generally, however, considerable waste occurs when feeding in the field, and allowance would have to be made for this.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1914.

Society.	Secretary.	Date.
Berry Agricultural Association	S. G. Banfield	Feb. 4, 5
Dorrigo A., H., and I. Society	W. R. Colwell	,, 10, 11
Moruya A. and P. Society	H. P. Jeffery	,, 11, 12
Alstonville Agricultural Society	C. D. McIntyre	,, 11, 12
Shoalhaven A. and H. Association (Nowra)	H. Rauch	,, 11, 12
Wyong A. Association	J. H. Kay	,, 12, 13, 14
Guyra P., A., and H. Society	P. N. Stevenson	,, 17, 18, 19
Gunning P., H., and I. Society	J. R. Turner	,, 18, 19
Newcastle A., H., and I. Association	E. J. Dann	,, 18, 19, 20, 21
Central Cumberland A. and H. Association	H. A. Best	,, 20, 21
Dapto A. and H. Society	J. H. Lindsay	,, 24, 25
Manning River A. and H. Association	S. Whitbread	,, 25, 26
Ulladulla A. Association	J. Boag	,, 25, 26
Inverell P. and A. Association	J. McIlveen	,, 25, 26, 27
Bowraville A. Association	C. S. Cliff	,, 26, 27
Robertson A. and H. Society	R. R. Graham	,, 26, 27
Uralla A. Association	H. W. Vincent	Mar. 3, 4, 5
Tenterfield P., A., and M. Society	F. W. Hoskin	,, 3, 4, 5
Tumut A. and P. Association	T. E. Wilkinson	,, 4, 5
Braidwood P., A., and H. Association	L. Chapman	,, 4, 5
Bega A., P., and H. Society	W. A. Zingel	,, 4, 5
Port Macquarie & Hastings Dist. A. and H. Society	T. Dick	,, 5, 6
Oberon A., H., and P. Association	M. J. Looby	,, 5, 6
Nepean District A., H., and I. Society (Penrith)	P. J. Smith	,, 6, 7
Central New England P. & A. Association (Glen Innes)	George A. Priest	,, 10, 11, 12
Molong P. and A. Association	W. J. Windred	,, 11
Coramba District P., A., and H. Society	H. E. Hindmarsh	,, 11, 12
Bombala Exhibition Society	W. G. Tweedie	,, 11, 12
Campbelltown A. Society	F. Sheather	,, 11, 12
Gulgong A. and P. Association	D. H. Spring	,, 11, 12
Tumbarumba and Upper Murray P. and A. Society	E. W. Figures	,, 11, 12, 13
Wauchope P. A. and H. Society	A. D. Suters	,, 12, 13
Gundagai P. and A. Society	A. Elworthy	,, 17, 18
Bangalow A. and I. Society	W. H. Reading	,, 17, 18, 19
Armidale and New England P., A., and H. Assoc'n.	A. McArthur	,, 17, 18, 19, 20
Cumnock P., A., and H. Association	K. J. Abernethy	,, 18
Cobargo A., P., and H. Society	T. Kennelly	,, 18, 19

AGRICULTURAL SOCIETIES' SHOWS—*continued.*

1914.

Society.	Secretary.	Date.
Camden A., H., and I. Society	C. A. Thompson...	Mar. 18, 19, 20
Goulburn A., P., and H. Society	G. G. Harris ..	" 19, 20, 21
Mudgee A., P., H., and I. Association	P. J. Griffin ...	" 24, 25, 26
Narrabri P., A., and H. Society	D. J. Bridge ...	" 24, 25, 26
Blayney A. and P. Association...	H. R. Woolley ...	" 25, 26
Macleay A., H., and I. Association	E. Weeks... ...	" 25, 26, 27
Crookwell A., H., and P. Society	J. H. Huxley ...	" 26, 27
Luddenham A. and H. Society	F. C. Emery ...	" 31, Apr. 1
Cooma P. and H. Association	C. J. Walmsley ...	April 1, 2
Coonabarabran P. and A. Association...	G. B. McEwen ...	" 1, 2
Upper Hunter P. and A. Association, Muswellbrook	R. C. Sawkins ...	" 1, 2, 3
Taralga A., P., and H. Association	G. Goodhew ...	" 2, 3
Royal Agricultural Society (Sydney)	H. M. Somer ...	" 7-15
Adaminaby P. and A. Association	W. Delany ...	" 15, 16
Scone A. Society	R. Lochhead ...	" 21, 22
Batlow A. Society	C. S. Gregory ...	" 21, 22
Kyogle P., A., and H. Society	R. J. Nithery ...	" 22, 23
Bathurst A., H., and P. Association	J. Bain	" 22, 23, 24
Hunter River A. and H. Association (West Maitland)	E. H. Fountain ...	" 22, 23, 24, 25
Tamworth P. and A. Association	J. R. Wood ...	" 28, 29, 30
Richmond River A., H., and P. Society (Casino) ...	D. S. Rayner ...	" 29, 30
Warren P. and A. Association	A. C. Tompson ...	" 29, 30
Orange A. and P. Association	W. J. I Nancarrow	" 29, 30 May 1
Northern Agricultural Association (Singleton) ...	E. J. Dann ...	" 29, 30, May 1
Clarence P. and A. Society (Grafton)	G. N. Small ...	May 6, 7, 8
Hawkesbury District A. Association (Windsor) ...	H. S. Johnston ..	" 7, 8, 9
Lower Clarence A. Society (Maclean)	J. McPherson . .	" 12, 13
Warialda P. and A. Association	C. J. Devine ...	" 12, 13, 14
Gloucester A., H., and P. Association	G. E. Furness ...	" 20, 21
Trangie P., A., and H. Association	A. K. Butter ...	" 20, 21
N.S.W. Sheepbreeders' Association (Sydney) ...	H. N. Bowden ...	July 1, 2, 3, 4
Murrumbidgee P. and A. Association (Wagga Wagga)	A. F. D. White ...	Aug. 25, 26, 27
Albury and Border P., A., and H. Society	W. I. Johnson ..	Sept. 8, 9, 10
Cootamundra A., P., H., and I. Association	T. Williams ...	" 15, 16
Murrumburrah P., A., and I. Association	J. A. Foley ...	" 22, 23
Temora P., A , H., and I. Association	J. Clark	" 22, 23, 24
Yass P. and A. Association	W. Thomson ...	" 30, Oct. 1

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VOL. XXV. PART 3. MARCH 2, 1914.

Agricultural Gazette of New South Wales.

Farmers' Experiment Plots.

WHEAT HARVEST 1913–14.

H. ROSS, Chief Inspector.

THE returns to hand from the Farmers' Experiment Plots are the results of the fifth year's systematic trials and experiments in connection with wheat culture in the principal wheat-growing areas of the State.

The usual area of the plots in the Southern, Western, and Northern districts is 10 acres, so it will be seen the experiments are conducted on a fairly extensive scale. Particular care is taken when selecting the plots not to choose the best part of a paddock, but to always establish them on a piece of land representative of the average soil in the district. In this way the principal wheat-growing soils in the State are fairly represented, and the results made applicable to almost every district.

The outstanding features of the experiments just concluded are, firstly, the large individual yields obtained, ranging from 25 to 43 bushels per acre for the more favoured varieties of wheat, and, secondly, the satisfactory average obtained in nearly all districts. Taking Federation as the standard variety, it will be found from the subjoined reports from the inspectors that the average yield of this wheat in the plots is 21 bushels 3 lb. per acre. The season in the Southern as well as Western and Northern districts was not favourable, yet the results are highly satisfactory, and once more prove that good yields can be obtained in spite of unfavourable seasons.

A Comparison.

A comparison of the average yield of the State with the average yield of the experiment plots for the last five years will be found interesting.

State Average.	bus.	lb.	Average of Experiment Plots.	bus.	lb.
1909 ...	14	3	... ...	24	23
1910 ...	13	1	... ...	18	45
1911 ...	10	5	... ...	20	17
1912 ...	14	6	... ...	24	8
*1913 ...	12	0	... ...	21	3
Average for 5 years ...	12	54	Average of 135 trials in 5 years... ...	21	43

These figures show that on fallowed land the Farmers' Experiment Plots have given a return of 21 bushels 43 lb. per acre, whereas on fallowed and unfallowed land the yield from all districts in the State for five years is only 12 bushels 54 lb. When it is taken into consideration that a certain amount of the wheat land in the State each year is fallowed, it can be safely assumed

* Estimated average.

on these figures that the Farmers' Experiment Plots on fallowed land have returned double the yield of the areas in the State under cultivation on non-fallowed land. Yet there are comparatively few farmers who consider fallowing absolutely essential. It is hard to say why this should be so, but, generally speaking, farmers put too much faith in the prospects of the coming season, and prefer to take the risk of those prospects being realised than make proper provision to ensure a reasonable certainty of success. Again, much faith is put in trying new kinds of wheat or new methods of manuring, yet the one really important factor to success, viz., fallowing and subsequent conservation of moisture, is but too frequently lost sight of. It is not intended here to discuss methods and fallowing and cultivation, but to remind farmers in the principal wheat districts that the amount of rain that falls during the growing period of the crop is, in average seasons, not sufficient to produce a 20 to 22 bushel crop, hence the necessity for conserving some of the previous year's rainfall and practically using two years' rainfall to produce one crop.

Does Fallowing Pay?

The all-important aspect of a rigid system of fallowing is that of £ s. d.

It is interesting to note how the cost of production and subsequent profit work out with non-fallowed and fallowed land; the figures are based on the State average yield and the average yield from the Farmers' Experiment Plots (135 tests) during the last five years.

Cost of Wheat-growing on Non-fallowed Land.

	£	s.	d.
Ploughing once, 6s. per acre	0	6	0
Harrowing once, 9d. per acre	0	0	9
Drilling, 1s. 6d. per acre	0	1	6
Seed, 45 lb. at 4s. per bushel	0	3	0
Superphosphate, ½ cwt. at 5s.	0	2	6
Pickling seed, 3d. per acre	0	0	3
Harvesting with harvester	0	3	0
Rent	0	6	0
Bags, 4 at 7d.	0	2	8
Cartage, at 1½d. per bushel	0	1	6
	£1	7	2

Allowing a yield of 12 bushels per acre for non-fallowed land (an estimate really in excess of actual yields), it will be seen that the cost is £1 7s. 2d. per annum, for a return of 12 bushels of wheat at 3s. 3d. per bushel—£1 19s., or a profit of 11s. 10d. per acre.

On the other hand, if the land be fallowed the cost will work out thus:—

Cost of Wheat-growing on Fallowed Land.

	£	s.	d.
Ploughing once, 6s. per acre	0	6	0
Harrowing 3 times, 9d. per acre	0	2	3
Cultivating once, 2s. 6d. per acre	0	2	6
Drilling, 1s. 6d. per acre	0	1	6
Seed, 45 lb. at 4s. per bushel	0	3	0
Superphosphate, ½ cwt. at 5s.	0	2	6
Pickling seed, 3d. per acre	0	0	3
Harvesting, 3s. per acre	0	3	0
Rent, 2 years at 6s. per acre	0	12	0
Bags, 7 at 7d. each	0	4	1
Cartage, at 1½d. per bushel	0	2	8
	£1	19	9

The return in this case on the average quoted is 21 bushels 43 lb. at 3s. 3d. per bushel—£3 10s. 7d., or a profit at the rate of 15s. 5d. per acre per annum.

In addition, in the former case there is always a possibility of almost total failure to be reckoned with, while in the other case there is always a reasonable certainty of success.

It is therefore evident that, apart from any other advantages gained by fallowing, such as the maintenance of fertility, the keeping in check of wild oats, &c., a rigid system of fallowing should commend itself to every wheat farmer in the Southern or Western portion of the State.

Varieties.

Contrary to previous experience, Federation did not come out on top as yielder. This, however, is easily accounted for by the fact that the season, especially on account of the early autumn rains, was more favourable to heavy yields from the late maturing varieties such as Yandilla King than the mid-season varieties like Federation, and farmers need have no fear that Federation is losing its yielding qualities in any way.

As has been pointed out on previous occasions, Rymer is a variety deserving of greater popularity than it enjoys at the present time; both from a grain and hay-yielding point of view it is one of the best wheats in cultivation. Bomen, a new wheat, has during last year's trials given such excellent results that farmers should make an effort to secure a few bushels for trial.

The season did not suit the early maturing wheats, Firbank, Bunyip, Florence, and Comeback, and the yields from these varieties are below the average

The seeding tests of 25, 35, 45, 55, and 65 lb. of seed per acre have shown that usually a sowing of from 45 to 55 lb., according to variety and time of sowing, is the best to adopt.

Manuring.

Great increases have been obtained by the application of 56 lb. of superphosphate per acre. This is more noticeable in the Southern and Western portions of the State than in the Northern parts. If any doubts on this point still remain in the minds of farmers, a perusal of the appended reports should dispel them.

Conclusions.

To sow the most suitable variety for the district at the right time is unquestionably a very important factor in the production of large crops; the application of artificial fertiliser helps materially towards filling the bags; feeding off and harrowing a crop frequently add a few bushels to the yield; yet all these operations sink into insignificance if the most important is neglected, and that is—FALLOW.

NORTH-WESTERN DISTRICT.

F. DITZELL, Assistant Inspector.

THESE wheat experiments were conducted in eleven different districts. The areas cultivated for the purpose ranged from 5 to 10 acres, divided into individual plots of either ½, 1, or 2 acres. Ten of these consisted of variety trials for grain, with or without manurial or seeding trials, and one of a variety trial together with a seeding trial for hay. The following are the names and addresses of the farmers who co-operated with the Department in the carrying out of these experiments :—

Mr. J. Perry, "Killara," Quirindi.
Mr. S. Forge, Oxley, Tamworth.
Mr. E. Currell, "Herbert Vale," Long Arm Road, Barraba.
Mr. J. H. McDonald, "Toryburn," Gunnedah.
Mr. W. B. Shaw, Kelvin, Gunnedah.
Mr. R. A. Studd, "Glenaire," Boggabri.
Mr. W. T. Penrose, "Retreat," Wean, Boggabri.
Mr. W. Palmer, "Pine View," Narrabri.
Mr. D. T. Charters, "Eularoi," Bellata.
Mr. W. Tonkin, "Garfield," Delungra.
Messrs. Kook Bros., "Rock Mount," Inverell.

The Season.

The 1913 wheat-growing season was distinctly a more favourable one for most of the North-western wheat districts than were any of the three preceding years.

The distinctive features of the season were the heavy rainfalls recorded from February to June inclusive, and then the dry conditions experienced throughout July, August, September, and to mid-October, together with the heavy frosts recorded in late July and in August.

Table I shows the rainfall recorded in each district from 1st January, 1913, until the various dates of planting. A perusal of this table will show how wet the sowing season was. Many delays in sowing were experienced. In some districts, notably around Boggabri and Baan Baa, many crops were sown too early—late in March and early in April—and consequently made a very rapid growth in April, May, June, and early July, when the conditions were very favourable to growth, and the soil was generally too wet to enable feeding-off to be practised to any extent. The result was that in many cases the crops were out in ear in late July and early August, and were frosted so severely by the heavy frosts then experienced as to be rendered useless for grain, and consequently they had to be cut for hay. Fortunately, in one sense, the weather was better haymaking weather than is usually experienced at that time of the year. In isolated instances the second growths from such plots gave a light grain yield, the late October rains benefiting

such growths. In many cases the great mistake was made of planting very early-maturing varieties like Bunyip and Florence, or early-maturing varieties like Comeback too early, with the result, to be expected, of the severe frosting already referred to. Farmers should especially guard against sowing "early," or quick-maturing, varieties early. Fortunately a large proportion of the crops, especially in the earlier districts, were sown at a seasonable time and these resulted in good yields. These were the mid-April to mid-June sowings, according to the various districts. On the other hand a considerable number of crops, especially in the later districts such as Inverell, were sown late and very late, from mid-June right on through July and well into August, according to the various districts, and these generally resulted in poor yields. These late sowings could not be avoided on account of the heavy rains experienced earlier in the sowing season. Little else than low yields could be expected, for most of them were just sown on the chance of sufficient rain falling promptly to give them a good start, and this rain they never received. Thus the germination was generally poor, and as unsuitable weather followed, the resulting yields were low.

A perusal of Table II will show the rainfall received during growth on the plots in the various districts. The plots were all sown in late April, May, or early June, and most of them received the benefit of good falls of rain after sowing in May or June, as it happened to be, and thus the germination was good (with the exceptions of Tamworth and Narrabri) and a good start was obtained, resulting in satisfactory crops. At Tamworth the ground was very wet when the plots were drilled in, and rain fell almost immediately, so that the ground could not be harrowed to cover the seed, and the result was therefore a very patchy germination and consequently low yields. At Narrabri the plots were situated on a clay loam over which a large quantity of water flooded, as a result of heavy rain soon after planting, and the ground became set very hard, so that the germination was poor, especially in the Marshall's No. 3 plots, but nevertheless fair returns were obtained. The dry time experienced from July to mid October, coupled with the late July and August frosts, the effect of which has been already referred to, was a severe test for the wheat, but the seasonably sown crops stood the ordeal very well. The heavy rains from February to June (especially where the ground had been ploughed early, and cultivated when required, and was thus in the best condition to receive and retain moisture) were responsible for the saturation of the subsoil, and this carried these crops through to successful yields. The rainfall recorded for September consisted generally of light showers, which, although very welcome, were not of any lasting benefit to the crops. The late October rains were fairly general, and although too late to be of any material benefit to the earlier crops in many instances, yet the later crops benefited considerably. The harvest was very early, the first crops in the Narrabri and Curlewis districts being stripped very early in October. They were of the Florence variety. Harvesting became general early in November, and even in the late districts was completed early in December. The harvest weather was very good—dry and hot—and consequently the samples were

generally heavy, and of a good bright colour. In some places fairly strong winds were experienced, resulting in a considerable amount of shelling amongst some of the later crops of varieties which are liable to shell, like Steinwedel and Florence.

No disease was very noticeable, the crops being free from rust, and in the great majority of cases from loose smut and bunt, also flag smut. In some cases powdery mildew was present in the earlier crops as a result of the heavy growth many of them made, but it was not responsible for any appreciable damage. Take-all was not prevalent. In no cases were thrips noticed on the wheat heads. Any crops that did not strip up to expectations were simply affected by the adverse late winter and spring weather conditions, and in a few cases by frosting.

TABLE I.—Showing Rainfalls previous to Growing Period, North-western District, 1913.

Month, 1913.	Quirindi.	Tamworth.	Barraba.	Gunnedah.	Kelvin, Gunnedah.	Boggabri.	Wean, Boggabri.	Narrabri.	Bellata.	Delungra.	Inverell.
	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.
January	226	77	246	196	196	64	64	204	81	334	414
February ...	399	262	382	365	365	324	324	297	250	213	235
March	216	623	207	226	226	294	294	215	528	243	357
April	447	195	361	245	245	283	283	310	318	111	111
May	504	375	145	...	...	...	...	542	...	523	596
June	...	12	...	...	...	...	...	13	...	...	...
Total ...	1,792	1,544	1,341	1,032	1,032	965	965	1,581	1,176	1,424	1,713

TABLE II.—Showing Rainfalls during Growing Period, North-western District, 1913.

Month, 1913.	Quirindi.	Tamworth.	Barraba.	Gunnedah.	Kelvin, Gunnedah.	Boggabri.	Wean, Boggabri.	Narrabri.	Bellata.	Delungra.	Inverell.
	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.
May	...	...	272	437	437	437	437	...	620	...	...
June	274	248	258	284	284	296	296	316	282	294	311
July	65	27	28	45	45	30	30	...	54	48	65
August	58	37	10	25	25	...	...	...	10	12	14
September ...	137	130	143	105	105	96	96	129	155	75	145
October	292	354	173	303	303	191	191	116	126	238	284
November ...	105	45	...	12	25	25	25	33	22	138	51
Total ...	931	841	885	1,211	1,224	1,075	1,075	594	1,269	805	870

Note re Inverell Plots.—870 points were received by all the varieties except Haynes' Blue Stem, which received an additional 33 points in the latter half of November.

Cultural Notes.

Quirindi.—Soil, friable, and deep red alluvial; summer fallowed; ploughed January, 1913; cultivated several times with spring-tooth cultivator; skim ploughed in April; cultivated with spring-tooth cultivator just before sowing; seed drilled at rate of 50 lb. per acre on 2nd and 3rd June; fed-off on 2nd August; harvested 3rd December.

Tamworth.—Soil, red loam; previous crop wheat, no manure; summer fallowed; ploughed January, 1913; well worked till sowing time; seed drilled at rate of 50 lb. per acre on 18th June; harrowed in August; early varieties harvested 24th November, and later varieties 3rd December.

Barraba.—Soil, clay loam; previous crop wheat, no manure; summer fallowed; ploughed January, 1913; well worked through autumn; skim ploughed in April; disc harrowed just before planting; seed drilled at rate of 50 lb. per acre on 22nd May; harvested 17th, 20th, 26th, and 27th November.

Gunnedah.—Soil, grey loam; previous crop wheat, no manure; fallowed; ploughed in November, 1912, after an early crop of wheat was stripped; cultivated with spring-tooth cultivator, after every rain; seed drilled in at rate of 50 lb. per acre on 28th April; harrowed in July; early varieties harvested 4th November, and later varieties 10th November.

Kelvin, Gunnedah.—Soil, fairly strong, red loam; previous crop wheat, no manure; summer fallowed; ploughed early in February; later harrowed; cultivated with spring-tooth cultivator, and harrowed again; seed drilled in at rate of 50 lb. per acre on 25th April; the Firbank and Bunyip plots were frosted in September, and damaged by a severe windstorm on 2nd October, and again, later, all the plots were damaged by storm; harvested 10th and 11th November.

Boggabri.—Soil, partly heavy loam, and partly sandy loam; fallowed; ploughed in September, 1912; the fallow was cultivated once or twice; drilled in 50 lb. seed per acre on 1st May; harvested 6th, 7th, and 11th November.

Wean, Boggabri.—Soil, sandy loam; summer fallowed; ploughed in January, 1913; fallow worked once or twice; seed drilled in at rate of 50 lb. per acre on 2nd and 3rd May; harvested 13th, 14th, and 15th November.

Narrabri.—Soil, clay loam; previous crop wheat, no manure; summer fallowed; ploughed in January, 1913; well cultivated through season with spring-tooth cultivator; drilled in 50 lb. seed per acre on 7th June; harrowed twice, 12th August; the early varieties were harvested on 17th November, and the later varieties on 22nd November.

Bellata.—Soil, new, red loam; summer fallowed; ploughed January, 1913; cultivated three times during season with spring-tooth cultivator; harvested 15th November.

Delungra.—Soil, strong chocolate loam; previous crop wheat, no manure; summer fallowed; ploughed in January, and again lightly in May; harrowed twice after second ploughing; seed drilled in at rate of 50 lb. per acre on 9th and 10th June; harrowed after drilling; harvested 25th November.

Inverell.—Soil, strong chocolate to black loam; previous crop wheat, no manure; summer fallowed; ploughed in January, 1913; cultivated several times during season with spring-tooth cultivator; 50 lb. of seed sown per acre on 5th June, with spring-tooth cultivator; all varieties cut for hay on 10th November, except Haynes' Blue Stem, which was cut on 4th December.

Variety Trials.

Reference to Table III will show the results obtained from the different varieties included in the experiments, and these were in keeping with the results obtained in previous years.

Yandilla King, Marshall's No. 3, and Rymer have all proved to be good dual purpose wheats, and especially good grain yielders. Yandilla King topped the yields at Delungra, a district suitable for the growth of slow-maturing varieties like this. Marshall's No. 3 was ahead at Wean, and Rymer has three wins to its credit in Tamworth, Barraba, and Boggabri. These wheats are all suitable for early and mid-season sowing, and Yandilla King is best sown a little earlier than the other two.

TABLE III.—Variety Trials for Grain, North-western District, 1913.

Name of Experimenter.	Bunyip.	Federation.	Firbank.	Florence.	Marshall's No. 3.	Rymer.	Thew.	Warren.	Yandilla King.	Bomen.	Plover.
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.
J. Perry, Quirindi	18 14	28 22	...	14 4	....	18 52	....	20 6	17 22	...	....
S. Forge, Tamworth	12 58	10 32	13 48	....	....	17 38	....	....	....	10 56	....
E. Currell, Barraba	....	....	20 40	18 58	...	29 49	22 22	....	23 14	....	....
J. H. McDonald, Gunnedah ..	16 30	..	14 32	....	19 52	20 6	...	22 24	20 18	....	....
W. B. Shaw, Kelvin, Gunnedah	9 16	26 47	9 12	....	24 18	25 54	..	...	28 23	....	....
R. A. Studd, Boggabri ..	28 20	..	20 47	20 44	....	31 37	....	....	30 59	....	....
W. T. Penrose, Wean, Boggabri	19 57	26 51	....	....	24 33	24 16	...	....	26 42	....	....
W. Palmer, Narrabri	24 2	.	22 34	....	16 53	18 58	...	....	21 45	....	....
D. T. Charters, Bellata ..	27 8	27 59	...	....	21 40	23 14	....	29 46	21 59	....	....
W. Tonkin, Delungra	18 53	19 14	....	....	...	23 44	....	....	27 47	19 2	21 2

Federation has proved to be a first-class grain yielder, having topped the yields for Quirindi and Kelvin, and is suitable for mid-season sowing. It is increasing considerably in popularity in all the North-western districts. It is not recommended for hay.

Warren gave very good returns for grain. Although only sown in three plots it topped the yields at Gunnedah and Bellata, and was runner-up to Federation at Quirindi. It is a good drought-resister. It is, however, weak in the straw, and should therefore be avoided in districts such as Inverell and Delungra, where the soil is rich and the rainfall fairly heavy. It is best suited for mid-season sowing.

Among the early maturing wheats, Bunyip has given good returns, and is suitable for mid-season and late planting. At Narrabri it topped the yields, and was runner-up to Warren at Bellata. It is recommended for grain only.

Florence has given fairly good returns, and is recommended for mid-season and late sowing, for hay and grain, especially in the drier districts. It is liable to shell.

Firbank also gave fairly good grain returns, but was no better than Florence, and not as good as Bunyip. It is a first class hay wheat, and is recommended as such, for mid-season and late sowing.

Thew was only tried at Barraba, and gave a fairly good return. It is, however, not recommended for cultivation for grain, but it is a good wheat for green fodder and hay.

Bomen, a new departmental cross-bred, was on its trial for the first time in the experiment plots at Tamworth and Delungra. The growth and returns were fairly satisfactory, and it will be tried more extensively in the 1914 season. It appears to be suitable for hay as well as grain.

The only other wheat tried was Plover, the farmer's variety in the Delungra plots. It returned a fairly good grain yield, but was not up to Yandilla King or Rymer.

In addition to the wheats mentioned above, Cleveland is also recommended for early and mid-season sowing as a dual-purpose wheat in the cooler districts of Delungra and Inverell; and Comeback is also recommended as a dual-purpose wheat for mid-season and late sowing, especially in the cooler districts.

The Influence of Fertilisers.

In past years the application of phosphatic and potassic fertilisers to the north-western wheat soils has not always resulted in sufficiently increasing yields to make the practice of fertilising profitable, and the general conclusion formed has been that the soils are rich enough without the application of fertilisers. In 1912, however, better results were obtained from the use of superphosphates, and hopes were entertained that the application of fertilisers in conjunction with a system of either long fallowing or summer fallowing might prove profitable, although it was not expected that the increased returns per acre would be any more than some 3 or 4 bushels. Five manurial trials were therefore conducted last season, and Table IV summarises the results obtained. It will be seen that at Narrabri the manured

TABLE IV.—Manurial Trials for Grain, North-western District, 1913.

Experiment Plot.	Variety.	Yield per Acre. Manured with 56 lb. Superphosphate per acre.	Yield per Acre. Unmanured.	Increase.	Decrease.
		bus. lb.	bus. lb.	bus. lb	bus. lb.
Tamworth ...	Federation ...	11 40	10 32	1 8	...
Boggabri... ...	Rymer	31 7	31 37	...	0 30
Wean, Boggabri..	Marshall's No. 3 ..	26 14	24 33	1 41	...
Narrabri... ...	Marshall's No. 3...	16 53	16 53	...	...
Delungra ...	Federation ...	17 10	19 14	...	2 4

and unmanured plots gave exactly the same yields, whilst at Boggabri and Delungra the application of superphosphate actually resulted in decreased yields. At Tamworth and Wean, however, increased yields were obtained, but they were only small increases, and the only conclusion to be arrived at is the one already stated, namely, that the application of fertilisers to the average wheat soils in the North-west has not so far proved profitable.

The Effects of Different Rates of Seeding.

Seeding trials were conducted in eight districts for grain; in each case plots being planted at the rates of 25, 35, 45, 55, and 65 lb. per acre, and with good stooling and also rather poor stooling varieties. The results obtained are given in Table V. With the exception of the Kelvin plots, which will be referred to later, in no case did the rates of 25 or 35 lb. per acre give

TABLE V.—Seeding Trials for Grain, North-western District, 1913.

Experiment Plot.	Variety.	Quantity of Seed sown per acre.									
		25 lb.		35 lb.		45 lb.		55 lb.		65 lb.	
		bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.
Quirindi	Federation ...	24	32	25	4	24	58	28	22	28	12
Tamworth	Bunyip	5	54	11	24	11	50	12	58	9	56
Gunnedah	Bunyip	15	6	15	50	17	54	16	30	17	42
Kelvin, Gunnedah ...	Bunyip	16	58	15	37	11	44	9	16	8	53
Boggabri	Bunyip	20	24	20	7	22	47	23	20	22	27
Wean, Boggabri ...	Marshall's No. 3 ..	19	43	22	41	25	2	24	33	27	18
Narrabri	Marshall's No. 3 ..	8	10	10	29	12	30	16	53	17	17
Delungra	Federation ...	17	41	19	18	22	18	19	14	20	13

heavier returns than the heavier rates of 45, 55 or 65 lb. per acre. In the two trials with Federation 45 and 55 lb. respectively gave the highest returns; in the two trials with Marshall's No. 3, 65 lb. gave the highest yield in each case; whereas in the three trials with Bunyip, again excepting Kelvin, the rates of seeding giving the highest returns were 45 lb. in one case and 55 lb. in the other two. It is only fair to add that in the Narrabri plots, where with Marshall's No. 3, 65 lb. per acre topped the seeding trial, the germination, as already explained, was bad, and therefore the 65-lb. plot had the best chance. If the germination had been normal, probably the 55-lb. plot, or even the 45-lb. would have topped the yields. The same remarks also apply, though to a more limited extent, to Tamworth. The above results only serve to strengthen the usual recommendation to sow from 45 to 55 lb. of graded seed per acre, according to existing conditions at the time of sowing and the variety used. It is a safe rule to sow a little heavier for late than for early sowings, and also for early maturing varieties, which are generally rather poor stoolers. In the case of the Kelvin plots the thinner seedings with Bunyip gave the best results, but this is easily explained. All these plots were frosted in September, and the thicker seedings being a little more forward than the thinner seedings

suffered more severely from the frost, with the result of lower yields. It was recognised last winter that it would be advisable to feed off these Bunyip plots at Kelvin, but on account of the saturation of the soil, and inability to obtain sheep, this could not be done.

The Inverell Hay Trial.

The results obtained are given in Table VI. Haynes' Blue Stem, a New England hay wheat, topped the yields mainly because, being a slower grower than any of the other varieties planted, it was in the right stage of growth during the latter half of October to benefit materially from the rains then experienced, which rains were not of any great benefit to the other earlier varieties. Haynes' Blue Stem is not recommended, however, for general sowing for hay, except in New England, as it requires a long growing season. Last season just happened to suit it.

Firbank has maintained its reputation as a good hay wheat, and can be recommended with confidence as a hay variety.

Marshall's No. 3 also gave a good hay return, the yields from Thew and Florence being somewhat lighter. These last three varieties are all suitable for hay, although Firbank is to be preferred to any of them.

Results which were not expected were obtained from the seeding trial. As the plots were sown late for hay and because Firbank is naturally not too good a stooler, it was expected that the heavier seedings would have given the heaviest returns. However, such was not the case, the lighter seedings giving the best returns. The light seedings stooled out better and grew taller than the thick seedings. This seeding experiment will be continued next season in a modified form.

TABLE VI.—Variety and Seeding Trials for Hay, North-western District, 1913.

Experimenters: Messrs. Kook Brothers, Inverell.

Variety and Quantity of Seed sown per acre.		Yield.		
	lb.	tons	cwt.	qr.
Firbank	25	1	15	2
Firbank	35	1	12	0
Firbank	45	1	10	3
Firbank	55	1	7	2
Firbank	65	1	6	0
Haynes' Blue Stem ...	50	1	17	0
Marshall's No. 3	50	1	14	3
Thew	50	1	7	3
Florence	50	1	7	2

General Remarks.

The results obtained on the experiment plots and also by farmers generally throughout the North-west last season again emphasise the necessity for earlier ploughing of the land for wheat than is generally the case in those districts. Wherever crops were sown seasonably on land long fallowed

(ploughed in July, August, September or October), or summer fallowed (ploughed in January, February or early March), and then cultivated as required to conserve the moisture supplied by the plentiful rains from February onwards, and to prevent the ground from being overrun with weeds, good results were obtained. These were the crops that stood the adverse spring conditions well. Summer fallowing, with cultivation of the fallow, can most confidently be recommended to farmers. Results from past years have proved the value of such a practice. Many of the paddocks, especially in the older cultivated districts, are very dirty with wild oats and various classes of weeds, and here the value of a long fallow, with proper cultivation of the fallow, comes in by cleaning up the land as well as conserving moisture. The wild oat pest will prove to be one of the most potent factors towards the introduction of fallowing. The best practice that can be recommended to north-western farmers for the present is to leave out their older, continuously cropped, dirty paddocks this coming season and fallow them in the coming winter or early spring, keeping down any weed growth until after next harvest by grazing sheep on the land as required, and then from December or January onwards to cultivate the land as required to reap the full benefits from the fallow. The land sown with crop this coming season and required for cropping again the following season should then be ploughed up as soon as possible after next harvest, the exact time being dependent on the rainfall, as often in the summer the ground is too hard to plough properly.

Having thus got the land in suitable condition for the production of profitable crops the best varieties of wheat, for either grain or hay as the case may be, should then be selected. Under the heading of variety trial these have already been discussed.

Care should be exercised to avoid sowing too early in the season. On the rich soils of the North-west, especially when well prepared, such a practice is liable to lead to a rank growth necessitating feeding off (which always results in more or less tramping of the ground) to avoid liability to lodging or frosting. Generally speaking from mid-April to mid-June in the earlier districts, and May and June and slightly later in the cooler districts are the most suitable times for sowing. Actual conditions at planting time will modify this general statement. Planting should be earlier for hay than for grain.

Special reference has already been made to the necessity for avoiding the mistakes in the past, and *not* to sow the early maturing or quick growing varieties for grain until about the middle of the sowing season has been reached.

SOUTHERN DISTRICT.

H. C. STENING, Inspector of Agriculture.

During the 1913 season, wheat experiments—comprising a variety trial and manurial and seeding experiments—were conducted in fourteen different

districts scattered through the south, on the farms of the following wheat-growers:—

Mr. M. J. Carew, "Selbourne," Deniliquin.
Mr J. Charles, "Stoneleigh," Grong Grong.
Mr. J. G. Chudleigh, "Glenbrook," Forest Creek.
Mr. R. O. Eulenstein, "Gracevale," Henty.
Messrs. D. and J. Gagie, "Spy Hill," West Wyalong.
Mr. F. Gollasch, "Pine Park," Milbrulong.
Mr. A. Hannah, "Hillview," Nubba
Messrs. C. H. and A. Hulme, "Burnley," Germanton.
Mr. G. Laidlaw, "Elm Park," Jindera *viâ* Albury.
Mr. J. Phipps, "Waratah," Berrigan.
Mr. J. Wesley Smith, "Emerald Hill," Ariah Park.
Mr. B. J. Stocks, "Linden Hills," Cunningham, *viâ* Harden.
Mr. W. Tait, "Stromness," Ringwood.
Mr. F. H. Tout, "Wambanumba," Young.

The Season.

In many respects the weather conditions of the past wheat-growing season were the antithesis of those of the preceding season. The year 1912 was characterised by a very dry autumn, wet winter, and good rains in November; while in the year just completed, exactly the opposite occurred. Good rains fell during the months of February, March, and May, as a result of which the soil was in excellent condition for drilling. In the earlier sown plots the seed germinated well; but in the case of the plots sown after the middle of May the germination was unsatisfactory, more so in the case of some varieties—particularly Marshall's No. 3 and Federation—the seed of which sprouted, but the embryo plants lacked vigour, and perished before reaching the surface. The growth on the plots sown early was satisfactory, but very slow growth was made by the crops sown in the later portion of the season.

The winter was extremely dry and frosty, and the months of July and August were reported in many districts to have been the driest on record. To give some idea of the paucity of the winter and early spring rainfall, at Wyalong there were ten falls of rain from 27th June to 14th October, a period of 15½ weeks, which totalled 99 points, the heaviest fall being 23 points.

To the lack of moisture during this period may be attributed the absence from the wheat ears of the bottom four or five spikelets, and the ears in the majority of instances contained only two grains per spikelet.

In some districts a number of showers fell during September, but they were insufficient to sink any depth into the soil, and were therefore not of much service. Unseasonably hot weather prevailed during the first half of the month of October, and as this was at the most critical stage of the growth of the wheat plant, the crops suffered severely, especially the early varieties. The situation was just saved by opportune rain on 15th October, which was

supported by further falls during the remainder of the month. If these showers had been followed up by good rains in November, extraordinarily good yields would probably have resulted. But, in addition to a lack of rain at this time, hot dry winds persistently raged day after day, and as a consequence the ripening grain shook out badly from the crops in the early districts, while in the later districts the great drain on the moisture caused the crops to dry off prematurely, and therefore they did not yield up to appearances. Many theories have been advanced as to the cause of the disappointing yields in eastern Riverina, but to my mind they are due to the severity of the hot winds following on the extremely dry winter and early spring. When the crops were ready for the harvesters, though dry, they possessed a green tinge.

Severe frosts occurred on 13th and 14th August after a prolonged period of dry weather, which injured many crops, particularly the early maturing varieties in the early districts, which at the time were just coming into ear. There were also late frosts on 26th and 27th September, but they were not sufficiently severe to do much damage except in low-lying situations.

The sample of grain produced in the early districts was excellent, while a large proportion of that produced in the later districts was pinched.

In the following table is shown the distribution of the rainfall during the growing period of the crops, at the fourteen farms where the experiments were conducted.

TABLE A.—Showing the Rainfall on the various Experiment Plots, Southern District, 1913.

Month, 1913.	Wyalong.	Ariah Park.	Milbrulong.	Berrigan.	Deniliquin.	Grong Grong.	Young.	Harden.	Ringwood.	Henty.	Nubba.	Germanton.	Forest Creek.	Albury.
	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.	Pts.
April ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
May ..	313	227	304	490	179	256	127	169	171	105	104	..	100	..
June ..	181	141	122	319	124	96	194	218	188	121	195	106	178	163
July ..	32	27	[illegible]2	57	54	82	49	60	43	44	60	87	21	82
August ..	34	48	77	88	54	45	84	105	95	80	69	147	20	78
September ..	33	68	224	190	176	156	139	119	156	222	155	125	44	189
October ..	169	171	156	340	126	268	262	288	225	128	266	86	193	165
November ..	..	..	31	28	..	..	41	31	34	62	43	25	..	20
December ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total ..	762	682	1,006	1,512	713	853	896	930	912	762	592	526	556	702

Cultural Notes.

Ringwood.—Soil, chocolate loam, new land; ploughed 5 inches deep in July, 1912; harrowed in October; cultivated with spring-tooth cultivator in March and again in May before drilling; seed drilled at the rate of 45 lb. per acre on 16th May; crop harrowed in August; harvested 5th, 9th, and 12th December.

Milbrulong.—Soil, red loam, which had been in cultivation for twenty years; ploughed 5 inches deep on 1st August, 1912; harrowed 10th September and

19th November; cultivated with spring-tooth cultivator on 4th December and th April, and with scarifier on 10th February and 21st April; seed drilled at the rate of 48 lb. per acre on 28th and 29th April; harvested 21st November and 5th December. Strong winds caused ripening grain to shake out badly.

Berrigan.—Soil, red loam, which has been under cultivation for nineteen years; ploughed 5 inches deep third week in June, 1912; harrowed second week in August; cultivated with disc cultivator first week in October and fourth week in February; harrowed fourth week in March and third week in April; seed drilled at the rate of 50 lb. per acre on 1st May; heavy rain just subsequent to sowing beat the soil down, and necessitated loosening the surface with harrows; harvested 24th November and 9th December. Strong winds caused ripening grain to shake out very badly.

Grong Grong.—Soil, red loam, which has been cultivated for four years; ploughed 6 inches deep in August, 1912; harrowed after ploughing; cultivated with spring-tooth cultivator in February and April; harrowed before drilling; seed drilled in 24th and 25th April at the rate of 45 lb. per acre; crop harrowed in July; harvested 24th and 25th November. Strong winds caused ripening grain to shell out badly. Bunyip was affected by frost in August.

Germanton.—Soil, loam, which had been out of cultivation for ten years, prior to which it had been cropped six times without manure; ploughed 5 inches deep in August, 1912; harrowed September; cultivated with disc cultivator in April; harrowed prior to sowing; seed drilled at the rate of 55 lb. per acre on 9th and 10th June; crop harrowed in August; harvested 23rd and 24th December. Crops did not yield equal to pre-harvest appearances.

Henty.—Soil, loam; ploughed at the end of September, 1912; harrowed early in November; cultivated with the disc cultivator early December, February, and April; seed drilled at the rate of 50 lb. per acre on 23rd and 24th May; harrowed after drilling; harvested 12th and 16th December. Germination not very satisfactory; crops did not yield equal to appearances.

Young.—Soil, sandy loam, new land; ploughed 5 inches deep in September; harrowed; cultivated with the spring-tooth cultivator both ways; ploughed second time in May; seed drilled at rate of 45 lb. per acre on 21st and 22nd May; harvested, 17th and 18th December. Germination was not very satisfactory. Federation, Rymer, and Cleveland plots were infested with blight and aphides. Crops did not yield equal to appearances.

Nubba.—Soil, red loam: third year in cultivation; ploughed 5 inches deep in March, 1913; cultivated with the disc cultivator in May; drilled, 26th and 27th May at rate of 48 lb. per acre; crop harrowed in August; harvested, 12th and 22nd December. Germination was very poor; "take all" patches were present in the crops. The crops did not yield equal to appearances before harvest.

Ariah Park.—Soil, light clay, new land; ploughed 4½ inches deep in July, 1912; cultivated with disc cultivator in April; drilled, 18th and 19th April at rate of 50 lb. per acre; harvested, 28th and 29th November. Bunyip was affected by frost in August, and Yandilla King, Marshall's No. 3, Comeback, and Firbank were also slightly "tipped." Strong winds caused some of the ripening grain to shake out.

Wyalong—Soil, clay loam, cultivated five years; ploughed 4½ inches deep in July; cultivated with spring-tooth cultivator in October and February; harrowed before drilling; seed drilled at rate of 45 lb. per acre on 21st and 22nd April; crop harrowed on 17th July; harvested, 20th and 26th November. Strong winds caused ripening grain to shake out badly. Bunyip was affected by frost.

Forest Creek.—Soil, grey loam; ploughed 5 inches deep on 14th October, 1912; harrowed after ploughing; cultivated with spring-tooth cultivator in November, April, and May; seed drilled at rate of 50 lb. per acre on 29th May; harvested, 24th and 26th December. Germination was very poor. Crops did not yield equal to appearances.

Harden.—Soil, sandy loam, second crop land; ploughed 5 inches deep in September, 1912; harrowed after ploughing; cultivated with scarifier October, February, and May; harrowed prior to drilling; seed drilled at the rate of 50 lb. per acre on 9th and 10th May; crop harrowed, September; harvested, 8th December. Germination not very satisfactory. Crops did not yield equal to appearances.

Deniliquin.—Soil, light clay, new land; previously wind swept, poor carrying country; ploughed 4 inches deep in July, 1912; harrowed, September and November; cultivated with spring-tooth cultivator in February and May; seed drilled on 6th May at the rate of 46 lb. per acre; harrowed after drilling; crop harrowed in July; harvested, 3rd and 10th December. Germination not very satisfactory.

Albury.—Soil, loam; ploughed 4 inches deep in July, 1912; cultivated with the spring-tooth cultivator in October, February, April, and May; drilled at the rate of 55 lb. per acre on 4th and 5th June; harrowed after drilling; harvested, 23rd and 24th December. Germination was very poor. Crops did not yield equal to appearances.

A Basis of Comparison.

As the same varieties were not sown in all districts, the averages of the actual yields of each variety are not comparable. The average yields of Yandilla King and Federation, grown in all districts, are 24 bus. 6 lb. and 21 bus. 49 lb. respectively; and, in order to arrive at the comparative value of the remaining varieties, the yields of the other varieties are only compared with that of Federation when sown on the same farms, and then reduced to a percentage basis.

They may be converted into bushels, in which form they will probably be better understood, by now taking 100 as equal to 21 bushels 49 lb., which is the average of the yields of Federation in all districts. The percentages and comparative yields of the varieties are thus worked out in Table C.

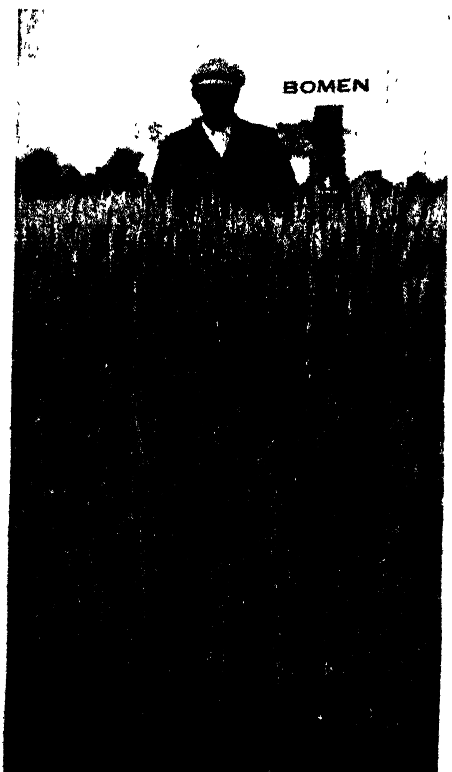
TABLE B.—Results of Variety Trials, Southern District, 1913.

Seed, 45 to 55 lb. per acre. Manure, 56 lb. superphosphate per acre.

Name and address of Experimenter.	Yandilla King.	Bomen.	Warren.	Federation.	Rymer.	Bayah.	Thew.	Marshall's No. 3.	Cleveland.	Comeback.	Cedar.	Bunyip.	Firbank.	Florence.
	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.	bus. lb.
W. Tait, Ringwood	27 19	32 12	...	35 41	22 24	...	...	...	24 23	...	24 55	26 32	...	...
F. Gollasch, Milbrulong... ...	30 33	28 40	...	28 15	22 20	...	...	28 34	...	...	...	22 11	19 32	...
J. Phipps, Berrigan	31 36	25 14	20 34	26 42	...	25 2	...	27 2	...	...	...	25 34	20 24	...
J. Charles, Grong Grong ...	30 49	25 14	24 27	24 10	24 55	..	...	...	...	...	...	15 24	17 26	...
C. H. and A. Hulme, Germanton	23 49	25 7	..	22 8	19 20	19 45	...	25 11	20 39	...	18 31	...	...	...
R. Eulenstein, Henty	23 56	24 37	...	23 26	20 33	...	18 10	19 29	21 18	...	...	...	...	...
F. H. Tout, Young	23 20	...	...	20 28	20 18	...	...	22 35	16 13	16 58	20 12	...	...	...
A. Hannah, Nubba	19 53	17 46	...	18 36	...	...	21 1	17 47	20 13	...	...	21 46	...	...
J. Wesley Smith, Ariah Park ...	22 48	...	22 26	22 14	...	...	...	19 24	...	17 22	...	14 0	14 44	...
D. and J. Gagie, Wyalong ...	24 0	21 42	...	21 16	23 21	...	...	...	...	...	...	11 34	12 38	10 45
J. G. Chudleigh, Forest Creek ..	14 49	...	...	16 5	...	17 8	...	12 1	21 43	17 43	...	19 36	...	...
B. J. Stocks, Harden	20 6	18 41	...	15 21	18 9	...	...	...	14 14	...	14 18	...	16 3	...
M. J. Carew, Deniliquin ...	23 16	15 52	18 0	14 12	19 53	...	...	...	...	...	..	10 37	6 34	...
G. Laidlaw, Albury	14 12	15 42	...	16 52	14 8	...	...	14 23	13 32	...	15 1	...	...	...

TABLE C.—Showing Percentages and Comparative Yields of Varieties, Southern District, 1913.

Order of Merit.	Variety.	No. of Plots.	Percentage.	Comparative Yield.	
				bus.	lb.
1	Yandilla King	14	110·5	24	6
				(actual average)	
2	Bomen	11	101·7	22	11
3	Federation	14	100·0	21	49
				(actual average)	
4	Warren...	4	97·9	21	21
5	Marshall's No. 3	9	95·7	20	53
6	Bayah	3	95·4	20	49
7	Thew	2	93·2	20	20
8	Rymer	10	92·6	20	12
9	Cleveland	8	90·3	19	42
10	Comeback	3	88·5	19	18
11	Cedar	5	84·1	18	21
12	Bunyip...	9	80·8	17	38
13	Firbank	7	70·5	15	23
14	Florence	1	50·6	11	2



A fine crop of Bomen.

Details of Varieties.

Yandilla King has topped the average yields. This may have been expected, as the season was favourable to the late maturing varieties, for an early germination was obtained, and the rains in October fell opportunely for them, whereas they were rather late for earlier varieties. Such a long-season variety is not generally considered suitable for the drier districts, yet in all these districts it has outyielded all other varieties. It would, however, be unwise to recommend an extensive sowing on the experience of one season, but it would be a good plan to commence the sowing season with a small area of Yandilla King, thus enabling an earlier start with the sowing than can be advised for main Federation crops, and giving a very reasonable chance for good yields of grain or hay.

In the more favoured districts, Yandilla King vies with Federation as a grain producer in addition to

providing the alternative of hay. When the atmosphere is moist it is a little "tough" to strip.

Bomen, on its first trial on the experiment plots, has given a very good account of itself. It is a tall-growing variety, with a tough straw that stands up well. It resisted the force of the strong winds, while other tall varieties "tangled up." As it does not hold its grain well, more grain was lost by shelling than in the case of other varieties. It makes a rapid early growth, stools fairly well, and matures a little later than Federation.

Federation.—This is the first season since the initiation of the Farmer's Experiment Plots, five years ago, that Federation has not topped the yields. In some of the plots, sown during the later portion of the sowing period, the germination of Federation was very unsatisfactory, and has accounted to some extent for a decreased average yield. But the yields of varieties maturing as early as, or earlier than, Federation, suffered by the hot weather which prevailed early in October, following on the dry spell, and the rains on 15th October came rather too late for them. If Federation has not come up to anticipations this season, still it is safe to assert that it has not lost in popularity, and, particularly in the drier districts, it will still retain its premier position.

Warren again upheld its reputation as a drought-resister, and this season averaged slightly less than Federation. The yields suffered by reason of its weak straw, the winds playing havoc with it.

Marshall's No. 3.—The average yield suffered by reason of the poor germination on some of the late-sown plots. In the more favoured districts it rivals Yandilla King as the best dual-purpose wheat. While Yandilla King is the more prolific yielder of grain, Marshall's No. 3 is the better hay wheat.

Bayah was given another trial, but failed to yield as well as Federation, which it closely resembles. As apparently it is not superior to Federation in any other respect, there is nothing to be gained by continuing its cultivation.

Thew was tried on two plots, and averaged better than the other early wheats. It is rather a better stooler than most of the early wheats, but is similar to them in the fact that it possesses a fairly weak straw.

Rymer did not yield as well as in previous seasons. As it matures about the same time as Yandilla King, the season should have been equally favourable to it. Owing to its rather weak straw, the crops in some districts lodged.

Cleveland is another good dual purpose for culture in the colder portions of the South-west Slopes. It makes excellent hay, retaining a green colour down to the base. It matures later than any of the other varieties sown on the plots, and therefore requires early sowing. Most of the grain produced by this variety was pinched.

Cedar was tried for the first time on the Southern district plots, and was tested against *Comeback*, another hard wheat, at Young, and yielded 3 bushels per acre more. When the atmosphere is moist it is very difficult to harvest.

Bunyip.—The returns from Bunyip were rather unsatisfactory, and, owing to its weak brittle straw, it lodged and gave great trouble at harvest-time, the harvesters frequently "choking." Owing to this experience, the area sown to Bunyip in future will probably be largely reduced. Bunyip's peculiar merit is its early maturity, and its use can be recommended when it is particularly desired to make a sowing very late in the season.

Firbank, on account of its weak straw, tangled up badly. It is essentially a hay wheat; as the straw ripens it becomes too brittle to be of value as a grain producer.

In a few districts a plot was sown with a variety selected by the farmers for comparison with those recommended by the Department. The yields are here given, compared with a departmental variety requiring about the same length of season for growth.

TABLE D.—Showing the Results from Farmer's Variety as compared with that recommended by the Department, Southern District, 1913.

District.	Farmer's Variety.	Yield per acre	Departmental Variety.	Yield per acre.
		bus. lb.		bus. lb.
Milbrulong ...	Wallace	24 33	Yandilla King ...	30 33
Deniliquin ...	Rattling Jack	17 46	" " ...	25 16
Harden ..	Lotz	17 53	" " ..	20 6
Wyalong ...	Dart's Imperial ...	27 7	" " ...	24 0
Grong Grong ...	Improved Steinwedel...	25 20	Federation	24 10
Ringwood ..	Federation (ungraded)	33 13	" (graded)..	35 41
Ariah Park ...	" "	21 52	" " ...	22 14

It will be seen that the departmental variety yielded better in every instance but two. At Wyalong, Dart's Imperial yielded 3 bushels 7 lb. better than Yandilla King, and at Grong Grong Improved Steinwedel yielded 1 bushel 10 lb. more than Federation. These two varieties are recognised as high yielders, but are not included in the Department's recommendations, owing to their flour-strength being below standard. At Ringwood and Ariah Park the farmer's ungraded Federation seed was tested against the Department's graded seed, and resulted in an increase of 2 bushels 28 lb. and 22 lb. per acre, respectively, in favour of graded seed, or a monetary return of 7s. 6d. per acre at Ringwood, and 1s. per acre at Ariah Park, for an outlay of 4½d., which is the cost of grading 45 lb. seed at 6d. per bushel.

Manurial Experiment.

In all districts, a plot was sown without manure for comparison with the manured plot of the same variety, with the following results:—

TABLE E.—Showing Results of Manurial Trial, Southern District, 1913.

District.	Variety.	No manure.		Manured with Superphosphate at rate of 56 lb. per acre.		Increase per acre due to manure.	
		bus.	lb.	bus.	lb.	bus.	lb.
Wyalong	Federation	15	42	21	16	5	34
Nubba...	"	16	23	18	36	2	13
Milbrulong	"	18	17	28	15	9	58
Ariah Park	"	19	2	22	14	3	12
Berrigan	" ...	20	37	26	42	6	5
Forest Creek	" ...	10	1	16	5	6	4
Harden	Cleveland ...	14	6	14	14	0	8
Germanton	" ...	23	10	20	39	(—) 2	31
Albury	" .. .	7	37	13	32	5	55
Young...	Marshall's No. 3	17	44	22	35	4	51
Henty	" "	13	1	19	29	6	28
Grong Grong... ..	Bunyip	14	9	15	24	1	15
Ringwood	"	23	45	26	32	2	47
Deniliquin	"	6	35	10	37	4	2
	Average ...	15	43	19	43	4	0

(—) Denotes decrease.

Compared with the unmanured plots, the yields of the manured plots range from an increase of just under 10 bushels at Milbrulong to a decrease of 2½ bushels at Germanton. The reason of this decrease is attributed to the fact that the unmanured plot benefited considerably more by the spring rains, as it was not so forward at the time, manure having the effect of hastening maturity, which, in an ordinary season, is an advantage. It illustrates how unwise it is to rely entirely on the results of one season's experiments, for in the previous season's test, on similar land on the same farm and with the same variety, the plot manured with 56 lb. superphosphate per acre yielded 11 bushels more than the unmanured plot.

It is also due to the abnormal season that the average increased yield of 4 bushels per acre is lower than the average increase of previous experiments.

Seeding Test.

In order to ascertain the quantity of seed that should be sown to obtain the best results, plots were sown with varying quantities of seed, viz., 65 lb., 55 lb., 45 lb., 35 lb., and 25 lb. per acre. In seven districts a poor stooling variety (either Bunyip or Firbank), and in a similar number of districts a good stooler (viz., Federation), was used.

TABLE F.—Showing results of Seeding Tests, Southern District, 1913.

District.	Variety.	65 lb. seed per acre.		55 lb. seed per acre.		45 lb seed per acre.		35 lb. seed per acre.		25 lb seed per acre.	
		bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.
Grong Grong ..	Federation ...	24	40	24	10	24	10	21	44	19	30
Ringwood	" ...	37	20	35	46	35	41	32	48	27	50
Deniliquin	" ...	14	46	16	28	14	12	14	8	11	44
Germanton	" ...	17	14	21	50	22	8	20	26	18	38
Albury	" ...	16	0	16	52	16	2	12	40	9	50
Young	" ...	20	26	16	8	20	28	16	10	12	18
Henty	" ...	23	36	21	56	23	26	21	15	18	45
Wyalong	Bunyip ...	10	4	11	36	11	34	10	54	12	12
Nubba	" ...	22	50	21	46	17	46	18	24	15	56
Ariah Park	" ...	12	38	13	22	14	0	14	45	15	27
Berrigan	" ...	22	28	25	34	22	4	23	18	20	[illegible]
Forest Creek ...	" ...	19	34	19	36	18	14	15	54	11	53
Harden	Firbank ...	18	16	16	50	16	3	15	0	12	25
Milbrulong	" ...	20	6	19	4	19	32	19	6	18	13
Average of all plots ...	...	19	59	20	4	19	40	18	10	16	4

The Results of the test at Wyalong and Ariah Park may appear strange, particularly in the case of a poor stooling variety like Bunyip, as they are the reverse of what might have been expected. This is attributed to a severe frost which occurred after a dry spell just as the ears of Bunyip were beginning to emerge from the blade. As the heavier the seeding the more advanced was the crop, so proportionately were the crops affected by the frost. A reference to the above table will show the average yields of the good stoolers and poor stoolers, as well as the average of the whole of the yields from the plots sown at the different rates. In the case of the poor stooling varieties the 55 lb. seeding gave the best results, while the plots sown with 45 lb. of Federation yielded the best average, bearing out the advice constantly given, that poor stoolers should receive a heavier seeding. According to the average yields of all plots, the 55 lb. seeding has given the best results, and this in a very dry season; 45 lb. of seed per acre has long been regarded as a sort of a standard rate for sowing, but with the improved methods of recent years this quantity may well be increased. It is, however, unwise to fix any definite standard, for there are many factors that must influence the rate of sowing, the principal of which are district, variety, and time of sowing. Taking 50 lb. as a happy medium, rather less seed should be sown in a dry district, or of a good stooling variety, or when sowing early; and a larger quantity should be sown for the opposite of these conditions.

Other conditions that should influence the determination of the amount of seed to sow are the fertility of the soil, the size of the seed, and the condition of the seed-bed.

WHEAT EXPERIMENTS, 1913.

LIMING WHEAT LAND.

H. C. STENING, Inspector of Agriculture.

As previously very little has been done in this State to test the effect on the wheat yield of an application of lime to the soil, the results of an experiment in liming wheat land, which was conducted during the past season at "Rockview," Old Junee, by the Department in conjunction with Mr. F. L. C. Ridgway, who manages the property for the Scottish Australian Investment Company, Limited, should be of considerable interest to all wheat-growers.

An area of 22 acres had already been limed, when it was placed at the disposal of the Department for experimental purposes; also two plots had received an application of Thomas' Phosphate, one on the limed area and

Lime Distributor at work.

the other on the unlimed area, in order to make a trial of what is known as the system of "double manuring." The Thomas' Phosphate was applied some months before the sowing period, and a small quantity of superphosphate as a "starter" was drilled in with the seed. The site of the experiments was an old cultivation paddock, which had been cropped for from sixteen to twenty years, or perhaps longer. The land was spring fallowed, being ploughed 6 inches deep in September, 1912, and then harrowed after ploughing. On the 28th September the Thomas' Phosphate was drilled in at the rate of 155 lb. per acre on the two plots intended for the "double manuring" experiment. Slaked lime was applied at the rate of 588 lb. per acre in October by means of a Jack's Lime Distributor, which spreads the lime uniformly, and the land was subsequently harrowed. Shortly prior to sowing the land was cultivated with the spring-tooth cultivator, and the drilling of the seed was commenced on 12th May, 1913. Sowing was

delayed by rain, and completed on 20th May. After sowing, the land was harrowed. Federation wheat was sown on the whole area at the rate of 48 lb. per acre.

The crops were harvested on 15th and 16th December, and they did not yield nearly as well as their pre-harvest appearance indicated, owing to a proportion of the ears drying off prematurely, under the influence of the dry weather and prevalent hot winds during November, following on an extremely dry winter.

The rainfall during the growing period, registered at "Rockview," was 9·37 inches, distributed as follows:—

Month.	Points.
May	154
June	128
July	82
August	97
September	183
October	229
November	64
Total	937

Unfortunately, the area of unlimed land available for comparative experiments was not as large as could have been desired, but where it was possible to make comparisons there was a material increase in the yields of the limed plots, as shown by the following results:—

YIELDS PER ACRE.

Manure per Acre.	Unlimed Plots.		Limed Plots.		Increase due to Lime.	
	bus.	lb.	bus.	lb.	bus.	lb.
No manure	15	30	19	9	3	19
56 lb. Superphosphate	14	48	18	44	3	56
155 lb. Thomas' Phosphate, 35 lb. Superphosphate	16	51	20	51	4	0

The remainder of the limed area was devoted to a manurial experiment, which resulted as follows:—

Manure.	Yield per Acre.		Increase due to Manure.	
	bus.	lb.	bus.	lb.
No manure	16	34	......	
72 lb. Superphosphate ...	25	43	9	9
56 lb. Superphosphate, 14 lb. Sulphate of Potash ...	21	30	4	56
56 lb. Bone-dust	19	46	3	12
28 lb. Bone-dust, 28 lb. Superphosphate ...	22	9	5	35
56 lb. Thomas' Phosphate ...	22	30	5	56

The lime obtained for this experiment was rock lime, which was subsequently slaked in the paddock prior to applying, by adding sufficient water to break it down into a powder. Thus a saving was made in freight and

handling; 4 tons 6 cwt. 2 qrs. 18 lb. of rock-lime producing, when slaked, 5 tons 16 cwt. 0 qrs. 8 lb. The price of the lime was 27s. 6d. per ton, and the freight from Goulburn to Rockview Siding was 5s. per ton, bags being supplied from "Rockview" to contain the lime during transit.

Thus the total cost of the lime at Rockview Siding was 32s. 6d. per ton. Mr. Ridgway supplies the following particulars of the expenses incurred in connection with the application of the lime for this experiment:—

	£	s.	d.
Rock-lime, 4 tons 6 cwt. 2 qrs. 18 lb. at 32s. 6d. per ton	7	1	0
Cartage from Siding to Paddock	0	5	3
Slaking lime, carting water, and driving lime distributor	2	4	3
Horse feed, sundries, &c.	1	0	0
Total Cost	£10	10	6

The total area limed was 22 acres 0 roods 38 perches, and the cost per acre works out at 9s. 5½d. An increase in the wheat yield of 3½ to 4 bushels per acre, valued at 10s. 6d. to 12s., has resulted from an application of lime costing 9s. 5½d. per acre to apply, showing a net gain of 1s. to 2s. 6d. per acre in one season. The full effect of an application of lime, however, is not exhausted in one year, and the benefit of an application of 5¼ cwt. will probably be manifest for three or four years. The whole cost, therefore, should not be charged against the first year's crop; and if spread over the number of years the effect of the lime is observable, it must result in a very payable proposition.

The experimental area will again be sown next season, when the cumulative effect of the lime and the residual effect of the fertilisers will be noted. Of course, it is not to be expected that all soils will readily respond to liming, much depending upon the amount of lime naturally present in the soil; but on soils deficient in lime, and containing high percentages of iron and alumina, the wheat yield should be greatly increased. In such soils the phosphoric acid, occurring naturally in the soil or applied in the form of superphosphate, is held in combination with the iron and alumina, and thus locked up in insoluble phosphates, rendering the phosphoric acid inert, even when present in large quantities. When lime is applied to these soils the phosphoric acid combines with the lime, and it is then in a more available form.

Potash, which generally occurs in the soil in rather unavailable forms, is also rendered more available by liming. The lime takes the place of potash in the insoluble compounds, thus leaving it in a form in which it may readily be absorbed by the plant roots.

Many other benefits, physical and biological, as well as chemical, may be derived by liming the soil, but it is not proposed to deal with them in this report.

During the coming season further experiments will be conducted at "Rockview" on a larger area, when more conclusive results should be obtained. One-third of the area has already been limed at the rate of 10 cwt. per acre, one-third at the rate of 5 cwt. per acre, and one-third has been left unlimed.

WESTERN DISTRICT.

W. R. BIRKS, B.Sc. Agric., Inspector of Agriculture.

THROUGHOUT the Western district proper, eight farmers' plots were established for the year 1913. The season was characterised, as in other parts of the State, by a favourable autumn, followed by a short winter and an exceptionally dry spring. Little or no useful rain fell over the greater part of the district from the end of June until mid-October. Fairly general, moderate rains then occurred, proving sufficient to save those crops which had been able to withstand the long dry spell, but too late to be of maximum benefit to the early maturing wheats. Thus, in most cases, with reference to the plots, the rain fell at the time when the ear was well developed in the early varieties, *e.g.*, Bunyip and Firbank, whereas with the later varieties, Rymer, Yandilla King, &c., the ear was still well down in the shot blade. The latter varieties were thus benefited to a greater extent than the earlier ones, and this no doubt accounts in some measure for their marked superiority in yields, as indicated in Table I below. In this list Federation occupies sixth place in order of yield, and the same reasoning probably applies here. It was more advanced, and therefore able to derive less benefit from the October rains than any of the varieties surpassing it in average yield. Had these rains been much longer delayed the returns all through would have been much poorer, and the order of superiority of yield would have been greatly altered. Probably, the early varieties and Federation would all have yielded better than the later ones. This year's results cannot, therefore, be taken as a criterion in comparing the relative merits of any of the early with any of the late wheats tried.

TABLE I.—Variety Trial, Western District, 1913.

Name of Experimenter.		R. W. Shelton, Nelungaloo.		J. A. Millar, Tullamore.		H. J. Beymond, Forbes.		D. A. Rich, Wellington.		J. H. Clements, Brundah.		T. Bragg, Mungeribar.		J. B. Roach, Gilgandra.		B. W. Carroll, Manildra.	
Variety.	Average.																		
	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.
Rymer	21	39	27	9	24	29	22	8	16	44	17	43	....		....		....	
Warren	19	38	....		21	27	...		19	41	....		21	33	21	2	13	52
Yandilla King	19	5	22	38	21	34	23	6	21	29	18	27	18	51	11	4	15	31
Bomen..	18	55	....		....		....		.. .		....		19	38	18	11	.. .	
Marshall's No. 3	18	28	23	21	20	35	....		...		17	36	17	45	....		13	2
Federation	18	6	23	35	....		22	42	24	46	13	22	....		13	7	11	5
Bayah	17	57	22	2	....		....		...		....		....		13	52	....	
Robs	17	16	....		....		17	19	18	44	....		15	45	....		....	
Comeback	15	8	18	45	....		18	18	14	28	....		....		13	58	10	11
Bunyip	15	1	13	29	*11	2	18	38	16	1	18	27	15	5	14	22	13	2
Firbank	14	9	....		16	40	...		..		. .		15	21	....		10	26
Florence	14	3	....		...		20	51	13	11	14	25	....		10	51	10	56
Zealand	12	1	7	51	16	6	....		....		....		12	7	....		....	
Cedar	....		....		.. :		....		....		....		....		13	26	....	
Cleveland	....		....		....		....		....		12	20	....		....		....	
Farmers' Seed—																			
Purple Straw	....		....		....		....		....		20	47	....		....		....	
Jade	....		....		....		....		13	12	....		....		....		....	
Farmer's Friend	....		....		....		....		13	1	....		....		....		....	

* Not comparable; sown later.

Table I shows the yield of each variety at each of the eight plots. In the cases of those tried in more than one plot, the results are averaged and the varieties are arranged in order of merit.

These results are from plots sown at the rate of—

45 lb. seed. per acre.
56 lb. superphosphate per acre.

While the averages are given for convenience, these are not strictly comparable, inasmuch as all the varieties were not sown on the whole of the plots, and in the case of Rymer, no sowings were made at Mungeribar, Gilgandra, and Manildra, where the yields of Yandilla King were on the decidedly low side.

Yandilla King, which was sown under fairly uniform conditions on all the plots, has been taken as the standard, whereas Bunyip, also sown on all the plots, had one plot sown later, which materially diminished its yield on that farm.

By comparing the yields of the different varieties with that of Yandilla King on a percentage basis, a somewhat fairer method of comparison may be used, though in the case of varieties sown only on one or two plots, which have given unduly high or low yields, the method is still open to objection.

In addition to the percentage, an assumed comparative yield is given on the basis of Yandilla King's actual average yield of 19 bushels 5 lb. over the eight plots.

SUMMARY OF VARIETY TRIAL, Western District, 1913.

Order of Merit.	Variety.	No. of Plots.	Percentage.	Comparative Yield.	
				bus.	lb.
1	Bomen	2	126·4	24	7
2	Warren	5	110·3	21	3
3	Bayah	2	106·5	20	19
4	Rymer	5	100·9	19	15
5	Yandilla King	8	100·0	19	5 (actual)
6	Federation	6	96·8	18	28
7	Marshall's No. 3	5	95·2	18	10
8	Florence	5	82·1	15	40
9	Comeback	5	80·6	15	23
*10	Bunyip	8	78·7	15	1 (actual)
11	Bobs	3	78·3	14	57
12	Firbank	3	75 9	14	29
13	Zealand	3	57·2	10	56
...	†Cedar	1	121·4	23	10
...	†Cleveland	1	66·8	12	45

* One plot sown later, and thus the yield is not quite comparable.
† As Cedar and Cleveland were only sown on one plot, no order of merit is assigned.

In every case the plots were situated on land fallowed in the winter or early spring of 1912—that is on "long fallow." No doubt it was this fact alone which enabled the wheats to withstand the very severe spring. At Nelungaloo, however, a portion of the plot of each variety was sown on land summer-ploughed (in January, 1913), and these were harvested separately. The striking results due to the fallowing are set out in Table II.

TABLE II.—Fallow Test at Nelungaloo, 1913.

Variety.	Fallowed Plot.		Unfallowed Plot.	
	bus.	lb.	bus.	lb.
Rymer	27	9	15	15
Yandilla King	22	38	13	36
Bayah	22	2	12	57
Federation	23	35	13	2
Comeback	18	45	9	42
Bunyip	13	29	6	36
Zealand	7	51	5	38
Marshall's No. 3 (manured) ...	23	21	14	25
,, ,, (not manured) ...	21	19	14	40
Average	20	1	11	46

That is to say, there was a difference of $8\frac{1}{4}$ bushels per acre in favour of the fallowed portion of the area.

In this connection it is interesting to note the effect of superphosphate on fallowed and unfallowed ground. Marshall's No. 3 was treated with and without manure as indicated, and it will be seen from Table II the manure produced an increased yield of 2 bushels 2 lb. per acre, a result in accord with those obtained in the other plots (*vide* Table III), whereas on the unfallowed ground the manure had a slightly prejudicial effect. This, of course, corresponds with general experience, namely, that in dry areas manure gives the best results only on well fallowed and thoroughly worked land. This fact possibly accounts for, to some extent, the popular prejudice against manure, which undoubtedly exists in certain parts of the district. Superphosphate has frequently been tried privately with a crop put in on stubble or new ground, and because no apparent result has been noted, the practice of manuring has been abandoned or its adoption—locally—hindered. Such a test, however, by no means settles the matter.

The results of the manurial trials conducted in connection with the plots are set out in Table III. At each locality a plot of one of the wheats was sown without manure beside the normal manured plot, and the differences in favour of the manure are shown below.

TABLE III.—Manurial Trial, Western District, 1913.

Locality.	Variety.	½ cwt. Superphosphate. per acre.		No manure		Difference.	
		bus.	lb.	bus.	lb.	bus.	lb.
Tullamore	Marshall's No. 3 ...	20	35	18	31	2	4
Wellington	Yandilla King ...	21	29	15	37	5	52
Forbes	Federation... ...	22	42	19	40	3	2
Gilgandra	Bunyip	14	22	12	52	1	30
Manildra	,, ...	13	2	12	20	0	42
Brundah	Rymer	17	43	13	17	4	26
Nelungaloo	Marshall's No. 3....	23	21	21	19	2	2
Mungeribar	Firbank	15	21	12	35	2	46
Average		18	34	15	46	2	48

The average difference—2¼ bushels per acre—represents in money value 8s. 4d., taking wheat at 3s. per bushel. The value of the ½ cwt. of superphosphate may be set down at 2s. 9d. at the outside, leaving a net return of 5s. 7d. per acre—no inconsiderable amount in dealing with large areas. And further, it must be conceded the season, owing to the dry spell at the critical period of growth, was anything but favourable for obtaining the best results from manure.

Rate of Seeding Test.

This was also conducted throughout the district. One variety in each locality was sown in five separate plots with varying amounts of seed. The results from the whole district may be summarised as follows:—

TABLE IV.—Rate of Seeding Test, Western District, 1913.

Seed sown per acre.	Yield. (Average of all plots.)	
lb.	bus.	lb.
25	13	55
35	15	50
45	16	28
55	17	15
65	17	23

Thus, up to 55 lb. of seed per acre the increase in yield in each case more than compensates for the extra seed sown; and the addition then of a further 10 lb. of seed gave only 8 lb. extra in yield.

In conclusion, referring back to the general averages, it will be noted that although they are satisfactory on the whole, some barely payable returns were harvested. On further analysis, however, it will be seen that these occurred almost exclusively in three localities where seeding was unavoidably delayed. This forms, perhaps, the most striking demonstration these plots have provided, as showing the imperative necessity for finishing off seeding promptly at the right season. Table V shows the average returns of the whole plot in each locality, together with the dates of seeding and the total rainfall during growth.

TABLE V.—Time of Seeding and Total Rainfall, Western District, 1913.

Plot.	Average Yield.		Date of Seeding.		Rainfall.
	bus.	lb.			inches.
Nelungaloo ...	21	10	30	April	7·81
Tullamore* ...	19	56	2	May	9·24
Forbes ...	19	28	6	,,	8·82
Wellington ...	18	30	19	,,	9·04
Brundah ...	15	58	24	,,	8·75
Mungeribar ...	15	45	8	,,	8·39
Gilgandra ...	13	42	10	June	5·70
Manildra ...	12	17	2	,,	5·20
Tullamore* ...	10	56	11	,,	5·72

* Seeding at Tullamore was unavoidably interrupted, and the area was sown in two sections on separate dates. The details of each section are shown separately here.

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The order of yields is thus almost precisely the same as the order in which the plots were sown—that is to say, the date of seeding practically determined the fate of the crop irrespective of locality, soil, and, to a certain extent, of rainfall also. Those planted before the end of May gave payable returns, while the June-sown plots were doubtful successes commercially. Certainly the June-sown plots received from 2 to 3½ inches of rain less than the others, but with their relatively poor germination, poor stooling, and poor growth generally, it is doubtful whether any quantity of rain would have enabled them to overcome the very severe handicap of late seeding.

WESTERN DISTRICT.

MUDGEE-COONABARABRAN LINE.

J. W. SHAW, Assistant Inspector.

WHEAT experiments were carried out at three different centres on this line during the past season, the names and addresses of the experimenters being as follows:—

Mr. E. Loneragan, "Wallinga," Mudgee.
Mr. F. S. Stacy, "Cumbandry," Gulgong.
Mr. E. M. Bowman, "Wargundy," Craboon.

At each centre the plots were devoted to a trial of different varieties, and a seeding experiment to test the effect on the yield of grain, by sowing as near as possible at the following rates per acre—25, 35, 45, 55, 65 lb. respectively. Five plots of the same variety were sown at each place, with the exception of Mudgee, where owing to a bad patch of ground, only four plots were sown; the drill was set to sow as near as possible to the amounts mentioned above, so the results should give some idea of the effect of what may be classed as thin, medium, and thick sowing.

Cultural Operations.

Mudgee.—Soil, whitish clay loam; disc ploughed, September, 1912; two cultivations, the first in December, the second just prior to planting; sown, 19th April; seed, 45 lb.; superphosphate, 56 lb.; fed-off, 17th and 18th July; harrowed, 20th July; again harrowed on 11th August; harvested, 2nd December.

Gulgong.—Soil, red clay loam; disc ploughed, September, 1912; two disc cultivations, first in December, second just prior to planting, sown, 17th April; seed, 45 lb.; superphosphate, nil (owing to accident to fertiliser gear); one plot manured by sowing broadcast, at the rate of about 2 cwt. per acre; harvested, 27th November.

Craboon.—Soil, red loam; disc-ploughed, July, 1912; harrowed just after ploughing; again harrowed in September; disc cultivated in January, 1913, and again just prior to sowing; sown, 25th April; seed, 45 lb.; superphosphate, 56 lb.; harvested, 26th November.

The Season.

The autumn of 1913 was a very favourable one, and quite the reverse to that of the previous year. It will be remembered that in 1912 no rain of any value fell until early in June, with the result that the bulk of the early sown wheat lay dormant in the ground for several weeks, and did not germinate until well into the month of June. At each of the three centres (Mudgee, Gulgong, and Craboon), more rain was recorded for the months of March, April, and May last year than for any other months of the year. The result was that all the wheat sown during this period germinated within a few days, and the weather being very mild induced a vigorous early growth. The month of May proved very wet, particularly at Craboon, where 682 points were registered. This had the effect in many instances of delaying sowing operations, and accounts for a considerable amount of late sown wheat. The early sown crops throughout the three districts gave great promise up to the beginning of August, but the remainder of the month and September proved very dry, and the wheat being well forward, suffered a severe check. This was most noticeable on stubble land, as the moisture conserved on fallowed areas was sufficient to tide the crops over the dry spell. The dry conditions affected the early maturing wheats most, as it was at this period that varieties like Bunyip, Firbank, &c., needed moisture to ensure good yields.

So severe were the weather conditions during September, and the early part of October, that farmers in many instances decided to cut the crops for hay, as the prospects of a grain harvest appeared very doubtful. Good rains were received during the latter part of October and November, and as a result some splendid crops of the later maturing wheats were harvested; the rains came at the time which suited these, whereas it was too late for the early maturing wheats.

Early and Late Wheats, and Time of Sowing.

Despite all that has been written from time to time on this subject, there is ample reason to believe that a great conflict of opinion still exists amongst farmers as to the correct meaning of the terms, "early maturing" and "late maturing" wheats. Almost every year cases occur where crops fail, or are reduced in yield as a result of sowing varieties in their wrong season; in the one under review farmers appear to have made more mistakes in this direction than in anything else.

Take as an example the four main early varieties recommended by the Department, viz., Bunyip, Firbank, Florence and Comeback. Under no consideration is it advisable to sow any one of these wheats (unless it be intended to feed-off) before the middle of May, otherwise it is very probable the crops will come into ear too early and get badly frosted.

The meaning to be conveyed in the words "early maturing" varieties, is that these wheats occupy the land for a shorter length of time, or in other words grow more quickly after germination than do the late maturing varieties. There are a great number of farmers who have misconstrued this

into just an opposite meaning, and in some instances these early maturing varieties have been sown in April, and in odd cases as early as March. This is a very serious mistake, as the crops will in all probability come into ear during the winter or early spring, and will be practically ruined by being frosted. Farmers would have far better results if they paid a little more attention to the season and general characteristics of the varieties they intend to cultivate, as negligence in this direction may result in very heavy losses.

Feeding-Off.

Owing to the very favourable autumn and mild winter conditions, the plots at Mudgee (particularly the earlier varieties) became too forward, and it was found necessary to feed them off with sheep. This was done on the 17th and 18th of July, after which the land was thoroughly harrowed. A number of farmers who were anxious to take advantage of the early autumn rains, and sowed varieties irrespective of their season, soon found that their crops were too far forward, and if the growth was not checked, they would get frosted. Those who adopted the wise practice of carrying a flock of sheep on the farm, were able to save the situation by feeding-off. Other farmers would have liked to buy sheep to eat off their crops, but the scarcity and high prices ruling during last winter for sheep suitable for fattening were greatly against purchasing at that time. The result was that many crops which could have been saved by feeding-off were practically ruined by frost as a result of coming into ear too early. As a general rule the best yields are seldom obtained from fed-off crops, and it is always wise to avoid this operation if possible by sowing varieties in their proper season.

Occasionally it becomes necessary to feed-off lightly. Even when varieties are sown at the right time, it must be remembered that it is very easy to do more harm than good by feeding-off, and under no consideration should it be done too late in the season. Generally speaking it is not advisable to feed-off after July, as should a dry spring follow, the crops do not recover from the check caused by the feeding-off, and the yields are invariably light. The sheep should never be turned on the crop when the land is wet, and the feeding should be done as quickly as possible; if left on the crop too long they make tracks through the paddock, and tramp the land into a very hard condition which seriously affects the second growth. After feeding-off, the land should always be thoroughly harrowed to break the tramped surface, and conserve as much moisture as possible.

Fallowing.

The good yields obtained on the experiment plots in each district are due to the fact that the land was well fallowed. Farmers see the benefits to be derived from this operation from year to year, but appear almost frightened to give it a fair trial for fear it will not pay. Although some good crops were to be seen growing on land that had not been fallowed, farmers must not imagine that this will happen every year. It can safely be said that the only payable method of growing wheat from year to year in this State, is by adopting a rigid system of fallowing. A very noticeable feature during the

dry spring of last year was the difference between the crops grown on fallowed land as compared with those growing on stubble land. This difference was not so marked during the early part of the year when the weather conditions were very favourable to growth, but when the dry weather set in the crops growing on fallowed land showed little or no effect as compared with those growing on stubble land. The effect of superphosphate was much more apparent on fallowed areas than on stubble land, due to the moisture which had been conserved in the former. Apart from the conservation of moisture and the many other advantages to be gained by this operation, fallowing has one very decided advantage which should be of interest to every wheat-grower, and that is, that a well-worked bare winter fallow is one of the most efficient means of dealing with black oats, which are fast becoming one of the greatest curses in the wheat areas of this State.

Conspicuous Varieties.

Although the season has suited the later maturing wheats better than the earlier varieties, a few belonging to the former group are worthy of special mention.

Rymer.—This variety is comparatively little known on this line. This is unfortunate, as it ranks next to Federation as the most consistent yielder throughout the State. Apart from its yielding qualities as a grain wheat, it makes beautiful hay, and is suitable for early and mid-season sowings. It was sown in each of the three plots on this line, and averaged over 34 bushels, which is plain evidence of its ability as a yielder. Farmers would do well to give it a trial.

Yandilla King.—This variety is better known than Rymer, is a good yielder and one of the best dual-purpose wheats. For the best results it should be sown in April, as it has a long growing season. At Craboon it yielded at the rate of 43 bushels 8 lb. per acre, and at Gulgong 30 bushels.

Cleveland.—This variety is better known and has been grown more extensively on this line than either of the varieties previously mentioned and can be recommended as one of the most suitable varieties for either hay or grain. It requires sowing early to obtain the best results, as it is a late variety. It yielded over 33 bushels at Gulgong, and slightly over 31 bushels at Mudgee.

Federation.—This variety is perhaps the best known, and the most extensively grown for grain on this line. One or two noted growers do not favour it on account of its liability to rust, and the shortness of its straw which makes it a poor hay wheat. Bayah is a variety which resembles Federation, but it is in no way superior. At Craboon, the latter yielded up to 36½ bushels per acre, at Gulgong over 31 bushels, and at Mudgee nearly 32 bushels. As a yielder it stands unrivalled, while its ability to stand and resist storms makes it one of the most valuable grain wheats that can be grown. May is the most suitable month for sowing.

Differences due to Superphosphate.

A number of growers on this line still doubt the advisability of applying manure with the wheat crops. Many theories are advanced against its use, but from the results obtained on the experiment plots during the

season under review, and on previous occasions these theories appear to have no foundation. At Mudgee the difference in the yield of the manured plot as compared with the adjoining unmanured plot of the same variety, was over 5 bushels. Unfortunately, at Gulgong, it was not possible to apply manure with the plots owing to an accident to the fertiliser gear. For comparison, one plot was broadcasted at the rate of about 2 cwt. per acre just prior to drilling, and the adjoining plot of the same variety sown without manure; the difference even from broadcasting, which is not recommended, was 1½ bushels. To get the best results from superphosphate it is essential that it be drilled in with the seed, so that it is reasonable to assume that if this course had been followed a much greater increase would have resulted from its use at Gulgong.

Florence was the variety chosen for manurial comparison at Craboon; this was unfortunate, as this wheat has a great tendency to shell, and the manured plot was ripe several days before harvesting, with the result that a considerable quantity had shelled out. The difference in the young growth due to the manure was very apparent at each centre, and there is every reason to believe that the application of from 40 to 56 lb. of superphosphate would result in the yields being very much increased.

Conclusions.

From the results obtained on the experiment plots on this line during the past season, and inspection of numbers of crops throughout each of the districts the following points are worthy of consideration:—

1. Fallow a definite area during the winter months, and keep thoroughly worked during the summer with harrows and cultivators.
2. Choose varieties of wheat that have proved most suited to the conditions of the district.
3. Sow as early as is consistent with the peculiarities of the varieties chosen.
4. Sow late-maturing varieties first, and early-maturing varieties last.
5. Apply from 40 to 56 lb. of superphosphate per acre when sowing the wheat.
6. Avoid feeding-off by sowing varieties in their proper season; if it becomes essential to check a forward crop, eat it off with sheep as quickly as possible, and thoroughly harrow the land afterwards.

TABLE I.—Showing Yields of Variety Trial, Mudgee-Coonabarabran Line, 1913.

Name and Address of Experimenter	E. Loneragan, "Wallinga," Mudgee.	F. Stacy, "Cumbandry," Gulgong.	E. M. Bowman, "Wargundy," Craboon.
Rainfall during growing period	11·21 ins.	11·18 ins.	13·17 ins.
Variety.	bus. lb.	bus. lb.	bus. lb.
Rymer	31 0	34 6	38 52
Yandilla King	....	30 0	43 8
Cleveland	31 10	33 6	....
Bayah	18 15	25 14	....
Warren	21 24	23 8	34 10
Bunyip	18 30	....	21 24
Florence	18 32	....	24 2
Florence (unmanured)	13 24	18 10	23 58
Federation (a)	See table below	31 24	See table below
Federation	....	29 52	....
Marshall's No. 3	....	See table below	39 58

TABLE II.—Showing the Results of Seeding Experiment, Mudgee-Coonabarabran Line, 1913.

Variety.	Amount of Seed.	E. Loneragan, "Wallinga," Mudgee.	F. Stacy, "Cumbandry," Gulgong.	E. M. Bowman, "Wargundy," Craboon
	lb.	bus. lb.	bus. lb.	bus. lb.
Federation	25	22 15	....	3[illegible] 10
"	35	24 22	....	30 36
"	45	31 52	....	33 48
"	55	... .	....	36 30
"	65	29 25	... .	33 54
Marshall's No. 3	25	....	26 50	.. ..
"	35	....	26 40	.. . ...
"	45	....	28 48	... .
"	55	....	26 40	....
"	65	....	26 50	....

NORTH COAST WINTER GREEN FODDER EXPERIMENTS, 1913.

G. MARKS, Inspector of Agriculture.

EXPERIMENTS in Winter Green Fodders were planted on the following farms during the autumn of 1913:—

Mr. J. Shipway, Nimbin.
Mr. J. F. Carlill, Jiggi Road.
Mr. H. Burton Bradley, Irvington
Mr. J. Burling, Upper Orara.
Mr. H. B. Faviell, Bonville.
Mr. C. J. Rogers, Stuart's Point.
Mr. W. Brown, Gladstone.
Mr. P. Secombe, Wauchope.

A plague of cutworms completely destroyed the plots on Mr. Carlill's farm at Jiggi Road, so that it was impossible to obtain any figures as to the merits of the varieties experimented with. Some idea of the numbers of these cutworms may be gauged from the fact that one portion of land was ploughed and planted three times, and even then no crop was obtained.

The season throughout was very unfavourable for exceptionally good yields. Torrential rains and floods kept the lands in a constant state of saturation, which prevented planting being carried out at the proper times. At all the plots the rain that was registered from the time of planting till the green weights were taken ranged from 35 to 41 inches. It would scarcely seem credible that exceptionally light yields, such as were obtained at the Upper Orara, Bonville, Stuart's Point, and Gladstone, could be obtained with such a plentiful rainfall; but an analysis of the distribution

of the rain recorded shows that the crops actually suffered in the few months from both floods and droughts. As an example one instance may be given. At the Upper Orara 33 inches out of the 41 fell during the first seven weeks after planting, and during this period the plots were flooded three times. The effect of this was to compact and consolidate the soil and stagnate the growth of the crops. During August no rain fell, but dry westerly winds caked the soil to such an extent that the little rain that did fall later did not do much good. As a result the growth of all the plots was more or less spindly in nature and stunted in growth.

Green Fodder Trials.

Mr. J. Shipway's Farm, Nimbin. Huguenot Wheat, unmanured. Yield, 8 tons per acre.

All the plots planted on the Coast experienced somewhat similar conditions.

The primary object of these experiments is to demonstrate what crops can be utilised to provide green feed for stock during the late winter and early spring months. Under normal conditions July, August, and September are the three months of the year when feed is scarce and when the dairyman needs plenty of green feed for his herd. It was intended to plant the

experiments fairly early, so as to get the crops to come in at this particular time, but the unfavourable climatic conditions already referred to prevented many from being planted till a later date. Although the earlier planting may not under ordinary conditions produce quite as heavy a yield, the feed would nevertheless be of greater value to the farmer, and a ton of such feed that would be available, say, in August, would be worth considerably more than two tons of similar quality that would not be available till the end of September, when there would in all probability be a flush of spring grass in the

Green Fodder Trials.

Mr. J. Shipway's Farm, Nimbin. Huguenot Wheat, manured. Yield, 9 tons 8 cwt. per acre.

pastures. On the other hand, if the object of growing wheat or oats is to provide a supply of hay, there is a decided disadvantage in planting early, the chief objection being that the crop matures in the latter part of August or early September, when the weather is decidedly cool for hay-making. This prevents quick drying, and the humid climate, with its heavy fogs, and frequent spring showers, retards the drying and curing to such an

Winter Green Fodder Experiments. North Coast District. Season 1913.

Varieties.	J. Shipway, Nimbin.	H. Burton Bradley, Irvington.	J. Burling, Upper Orara.	H. B. Faviell, Bonville.	C. J. Rogers, Stuart's Point.	W. Brown, Gladstone.	P. Secombe, Wauchope.
Rainfall in inches.	....	38·15	41·67	40·06	35·23	38·43	36·62
	tons cwt qrs. lb.	tons cwt qrs. lb.	tons cwt. qrs. lb.	tons cwt. qrs. lb.	tons cwt qrs. lb.	tons cwt qrs. lb.	tons cwt. qrs. lb.
Thew	5 0 0 0	7 18 2 8	3 8 0 4	2 8 3 0	3 19 1 24	4 8 1 16	6 0 2 4
Thew and Field Peas	....	....	....	....	....	10 0 1 22	....
Huguenot	8 0 2 24	....	....	....	....	....	7 10 3 16
Huguenot and Field Peas	12 9 0 12	....	....	....	....	....	10 6 2 22
Medeah	....	7 14 1 4	4 12 0 16	2 17 2 8	4 3 0 4	2 3 1 6	....
Medeah and Field Peas	....	9 17 2 20	4 5 2 24	2 9 0 12	4 1 1 0	....	....
Algerian Oats	7 14 0 2	5 4 1 24	5 15 3 0	4 14 0 22	5 10 2 24	5 0 1 22	8 5 0 20
Black Winter Rye	4 16 3 14	7 16 1 20	5 0 0 20	3 8 1 6	3 10 0 10	2 15 1 12	5 12 3 22

Experiments with Field Peas sown with Wheat, and Wheat alone. North Coast District. Season 1913.

Varieties.	Nimbin	Irvington.	*Upper Orara.	*Bonville.	*Stuart's Point.	Gladstone.	Wauchope.
	tons cwt. qrs. lb.	tons cwt. qrs lb	tons cwt. qrs. lb.	tons cwt. qrs lb.	tons cwt. qrs. lb.	tons cwt. qrs. lb.	tons cwt. qrs. lb.
Wheat and Field Peas	12 9 0 12	9 17 2 20	4 5 2 24	2 9 0 12	4 1 1 0	10 0 1 22	10 6 2 22
Wheat alone	8 0 2 24	7 14 1 4	4 12 0 16	2 17 2 8	4 3 0 4	4 8 1 16	7 10 3 18

* At these plots the Field peas made very little growth owing to dry weather in early spring.

extent, that the greatest skill and judgment has to be exercised to prevent total loss. Even when hay is made, the continual dampings and long exposure in the field have a detrimental effect upon the colour and quality, factors that are of extreme importance if the product is to be marketed. With such an early maturing variety as Thew, sowings in the latter end of March and April would provide green feed for July, August, and September. On the other hand, if hay is required, the sowings should not be made till May. This would time the crop to be cut in the latter part of September and during October, which latter month on the coast is the best suited for haymaking, being usually hot and dry.

The greater number of the plots were cut and weighed in September at the stage when they had reached their maximum green growth. For feeding purposes the crops could have been utilised, if required, a month earlier, though the yield would not have been nearly so heavy. Owing to the scarcity of seed consequent upon a heavy demand the same variety could not be used throughout for combining with the field peas and also for the fertiliser trial, but the differences in results were not affected in consequence.

Wheat v. Oats.

On coastal dairy farms where winter green feed is grown the principal crop in use is oats. Though it is a valuable crop it is late in maturing. The universal custom owing to labour conditions is to graze the paddock or portions of it from time to time during growth. Though the conditions perhaps justify this system, two facts stand out conspicuously—

1. There is a considerable loss in yield, due to the immature condition of the crop, and the damage through soiling by stock and quantities being pulled out by the roots.
2. There is a corresponding decrease in its feeding value. This latter loss is not universally recognised, a popular idea being held that all feed so long as it is green is very much alike from a feeding point of view.

The experiments that have been carried out on the coast for the past few years have proved the superiority of certain wheats over oats for providing an earlier feed and, for its season of growth, a much heavier yield. The wheat is also more palatable to stock. Of the varieties tried Thew is the earliest, and can be strongly recommended where early maturity is essential. It is not however rust-proof. Though most of the plots showed little rust on Thew, the Algerian oats near-by were badly affected. Under normal coastal conditions Thew could be grown over a very considerable area on the higher lands and depended upon to yield a clean hay crop. In this connection there is a profitable field for supplying the local markets with hay and chaff, the bulk of which comes by boat from Sydney to all the rivers, and with freight and other charges makes the product a costly item to the consumer.

Huguenot is a later variety of wheat, is a stronger grower, and a much heavier cropper. Its strong point is its freedom from rust, even when

growing alongside oats badly affected. On this account it can be strongly recommended for growing in the low-lying areas that skirt the coast, and lower portions of the rivers, where the presence of moist conditions under a heavy rainfall favour rust. It is also better suited than Thew for planting with peas or vetches The stronger growth is an advantage in supporting the heavy growth of the legume that the heavier soils produce. Being later in maturing it fits in better with the legumes, so that both are harvested at their best stage for feeding purposes. When peas or vetches are planted with Thew it has been observed that the Thew is fit for harvesting long before the legumes have reached their full growth.

Medeah, though strong and hardy, is not so suitable as the Huguenot on account of the beard development. It is, however, rust-resistant, and if intended for hay should be cut well on the green side, and before the awns have commenced to harden. In the experiments under review the Thew variety was at a slight disadvantage to the other varieties on account of there being no rain during August. The later varieties received the benefit of a good storm in September, before they were harvested, though this had not the same effect as if it had come a few weeks earlier.

In comparing the yields of oats with the wheat there is a marked difference in some of the plots. The comparatively high yield of oats all through is entirely due to the good rains, ranging from 5 to 6 inches, that fell in September, which did not benefit the earlier wheats to any extent Up to this period the oats gave every indication of being a total failure, but with these warm, soaking rains, they recovered and freshened wonderfully, and produced a very creditable crop. To give some idea of the differences in growth between oats and wheat, weights were taken of oats at Nimbin at the same time that Thew and Huguenot were weighed. At this period the oats were only from 1 foot to 18 inches high, while the wheats ranged from 3 feet 6 inches to 4 feet. These weights were taken on the 4th September:—

Huguenot and peas gave	...	12 tons	9 cwt.	per acre.		
Huguenot	,,	...	9 ,,	8 ,,	,,
Thew	,,	...	5 ,,	0 ,,	,,
Algerian oats	,,	...	4 ,,	0 ,,	,,

This shows conclusively the advantage of wheat in producing a heavier yield than oats in a shorter time.

Wheat and Peas v. Wheat alone.

This experiment was carried out to show the effect of combining a legume —field pea—with wheat. It has long been known to the progressive agriculturist that the growing of a legume with a cereal such as wheat increases the feeding value of the resultant fodder. It also gives a heavier yield of green feed, and does not impoverish the soil to the same extent as when the cereal is grown by itself. The growing of field peas or vetches by themselves renders them somewhat difficult to harvest with either a scythe or mower owing to their recumbent habit of growth, but this objectionable

feature can be readily overcome by planting it in conjunction with a strong-stemmed plant such as wheat, particularly the Huguenot variety. The wheat alone was sown broadcast at the rate of 2 bushels per acre. The amount of wheat for the combination crop was reduced to 1½ bushels, with the balance, ½ bushel, substituted with field peas. At the Upper Orara, Bonville, and Stuart's Point the peas were practically failures. The unfavourable weather conditions in these localities were responsible for a poor, sickly, spindly growth, and there were no appreciable differences in the plots. At

Green Fodder Trials.

Mr. J. Shipway's Farm, Nimbin. Huguenot Wheat and Field Peas. Yield, 12 tons 0 cwt. per acre.

all the other plots where the soils were of a heavier and more retentive nature the peas made a good growth and increased the yield from 2 to 5½ tons accordingly. At Nimbin the peas made an exceptionally good growth, and the vines attained a length of 7 feet, completely breaking down the Huguenot wheat, which in the wet weather was not strong enough to support it. It was observed that the peas did remarkably well on all the heavy black soils, while on the lighter soils they did not do nearly so well.

The growing of peas with wheat has also a good effect upon the mechanical condition of the soil. Wherever the peas were grown the land that was ploughed after harvesting turned over in a better condition and appeared to be more friable than where the wheat or oats were grown by themselves.

Fertiliser Trials.

The fertiliser used was superphosphate applied at the rate of 1 cwt. per acre. The unfavourable weather conditions were entirely against expecting any good results from fertilisers, but at Nimbin and Wauchope the differences in favour of the manure ranged from 1 ton 8 cwt. to 1 ton 6 cwt. respectively. At these plots the differences in the growing crops were readily discernible.

WINTER GREEN FODDER EXPERIMENTS. FERTILISER TRIALS. NORTH COAST DISTRICT. SEASON 1913.

Name of Experimenter.	Variety.	Superphosphate (1 cwt. per acre).				Unmanured.				Increase.			
		t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.
J. Shipway, Nimbin	Huguenot ...	9	8	1	16	8	0	2	24	1	7	2	20
H. Burton Bradley, Irvington	Thew ...	7	18	2	8	7	15	1	12	0	3	0	24
J. Burling, Upper Orara ...	Thew ...	3	8	2	8	3	8	0	4	0	0	2	4
H. B. Faviell, Bonville ...	Thew ...	2	13	0	14	2	8	3	0	0	4	1	14
C. J. Rodgers, Stuart's Point..	Thew ...	4	10	0	20	3	19	1	24	0	10	2	24
W. Brown, Gladstone	Medeah ..	2	10	1	22	2	3	1	6	0	7	0	16
P. Secombe, Wauchope ...	Huguenot ..	8	16	3	4	7	10	3	16	1	5	3	16

Summary.

Allowing for abnormal conditions the experiments have demonstrated that wheat of approved varieties provides a much earlier feed than oats. The sowing of peas with wheat greatly increases the yield, which chemical analysis shows to have a higher feeding value. In many instances, the application of fertilisers will considerably increase the yield. Sowings of wheats and oats can be made at intervals so that they will be available for green feed during the winter and early spring when the natural herbage is deficient. Should favourable conditions ensure plentiful supplies of grass in the pasture, all of the wheats, peas, or oats, can be profitably converted into hay and utilised for home use or marketed at some future date. Rye, though yielding well, cannot be compared with wheat or oats as a fodder. It is harsh and wiry in nature, unpalatable, and cannot be recommended where the other varieties can be grown.

SOUTH COAST WINTER FODDER PLOTS, 1913.

R. N. MAKIN, Inspector of Agriculture.

THE dry summer of 1912-13 was followed by an exceedingly wet autumn and winter on the South Coast, as much as 6,011 points being registered in one district from 1st March to 30th June. Owing to the wet state of the ground in many cases the farmers were unable to get in the usual crops for winter and spring feed. Fortunately the winter was not a hard one, and the shortage of feed was not manifest until towards the end of August, when the dry weather was making itself felt in some parts. Farmers who had sown Thew wheat found in it a most desirable fodder for early spring use, when other feed was scanty.

The Experiments.

Plots were sown at Unanderra, Kangaroo Valley, and Moruya. On account of the heavy rain they made but little headway at first, and when some benefit might have accrued from feeding them off, the ground was still too boggy to carry stock.

Objects.

The experiments were carried out to determine the most suitable variety of wheat for early green fodder and the best manure to increase the bulk. Three variety and two manurial trials were conducted.

Rainfall.

The summer continued dry right up to March, when a very wet spell occurred which did not take up till July. At Unanderra 2,889 points were re.istered during the growing period of the plot; at Moruya, 2,842; and Kangaroo Valley, 4,834 points fell.

Preparation of the Land.

Of the areas selected only one was summer fallowed, *i.e.*, at Kangaroo Valley. Other plots would have been fallowed, but for the dry weather, which practically made ploughing impossible. South Coast farmers have not fully realised the benefits from fallowing. There is no doubt that the run of dry summer seasons experienced of late will bring about a different system of farming. The practice of fallowing the ground for summer and winter crops should certainly be given more consideration. During the spring heavy winds are usually experienced and little rain occurs; it is then that the harrow should figure often in breaking the surface in order to trap the moisture.

Sowing.

Seed was sown broadcasted at the rate of 2 bushels to the acre. It is to be regretted that a better system of sowing winter feed, such as wheat and oats, is not in practice on the South Coast. Drilling is a means whereby an even distribution of seed and manure is secured, resulting in a even germination and better growth. The saving in seed in sowing is enough to warrant the

expense. The Department having secured a drill for next season's experiments on Illawarra, it is hoped that farmers will make themselves acquainted with this up-to-date method of sowing.

Observations during Growth.

It was noted during the growth of the plots, in every case, that Firbank and Florence were slightly earlier than Thew, whilst John Brown was considerably later than any other. The crops were healthy throughout.

Results.

From the tabulated results it will be seen that John Brown topped the returns, and yielded as much as 8 tons 2 cwt. 0 qr. 2 lb. per acre at Moruya. It was thirty-nine days later than Thew in maturing. Although the latter yielded some 2 tons per acre less, it came in at a time when feed was scarce, and on that account it was of greater value. John Brown carried more flag than the other wheats and stooled better. Thew has certainly proved a most valuable wheat for early fodder, but a wheat stooling better, carrying more flag, and coming in at the same time would be preferable. Wheat for green fodder has come to stay on the South Coast, and each season there are greater areas sown with Thew, chiefly, and it is gratifying to hear reports of the success of farmers growing it. In point of yield Thew is ahead of Firbank and Florence. Florence was tried for the first time on the plots, but on this occasion it did not stand the trying weather so well as Thew. It stools better, however, and further experiments should prove its value. Firbank had been tried before and has been again beaten by Thew; it is, however, a strong grower, early, and worthy of further trial.

SOUTH COAST WINTER FODDER PLOTS, 1913.
Variety Trial.

Variety.	J. Chittick, Kangaroo Valley.				A. Louttit, Moruya.				L. Carr, Unanderra.				Average.			
	t.	cwt.	qrs.	lb.	t.	cwt.	qrs.	lb.	t.	cwt.	qrs.	lb.	t.	cwt.	qrs.	lb.
John Brown	3	15	2	5	8	2	0	2	3	8	1	0	5	1	3	21
Thew	2	14	1	4	5	17	3	4	4	10	3	0	4	7	2	12
Firbank	3	0	0	0	6	0	2	0	2	18	3	0	3	19	3	0
Florence	2	17	3	12	4	1	0	3	4	10	3	0	3	16	2	5

The Manurial Trials.

In the manurial trials the success of P5 is most pronounced, as it heads the returns on each plot. It is composed of 16 parts superphosphate and 4 parts sulphate of potash, and costs about 6s. 9d. per cwt. Applied at the rate of 1¼ cwt. per acre, the return from the manured above the unmanured plot at Moruya was 6 tons 12 cwt. per acre. This result from such a small outlay is most convincing. The M5 mixture, composed of 13⅓ parts superphosphate and 6⅔ parts sulphate of ammonia, gave the next best return, and costs about 7s. per cwt. It was applied at the rate of 1½ cwt. per acre.

From this it appears that potash was chiefly required; still the addition of ammonia to superphosphate yielded, on the average, an increase of 1 ton 13 cwt. per acre, which justified the expense. The returns from the plot treated with the complete manure are not up to either P5 or M5. It may be that there was neither sufficient potash nor ammonia in the mixture, which was composed of 12½ parts of superphosphate, 2½ parts of sulphate of potash, and 5 parts of sulphate of ammonia. In the test with superphosphate, the fact that the smaller amount of superphosphate gave the better results is interesting. This was noted in previous experiments, and it appears, at sight, that the extra ½ cwt. is not necessary; however, further experiments must be conducted to conclusively prove these points, and, no doubt, by drilling the manure in, as will be done on Illawarra this coming season, more satisfaction will be given.

SOUTH COAST WINTER FODDER PLOTS, 1913.

Manurial Trial.

Manure.	Amount per acre.	J. Chittick, Kangaroo Valley.				A. Louttit, Moruya.				Average.			
	cwt.	t	c.	q.	lb.	t.	c.	q.	lb	t.	c.	q.	lb.
P5—Superphosphate ... Sulphate of potash	1¼	3	14	0	10	7	17	2	8	5	15	3	9
M5—Superphosphate ... Sulphate of ammonia	1½	3	13	0	14	6	14	1	0	5	3	2	21
W2—Superphosphate ... Sulphate of potash Sulphate of ammonia	1½	3	8	1	19	6	6	3	24	4	17	2	22
Superphosphate	½	2	14	1	4	5	17	3	4	4	6	0	4
Superphosphate	1	1	4	0	21	5	17	0	6	3	10	2	13
Unmanured	...	2	6	1	6	1	5	2	4	1	15	3	19

TURKEYS WITH ENLARGED CROPS.

YOUNG turkeys at Quirindi lately showed a very enlarged crop, and in one or two cases these hung down between the legs. Apart from this defect they seemed to be in a fairly healthy condition. The birds were well fed and had a running creek to drink from.

Mr. Hadlington, the Poultry Expert, reported that such dilated crops may be caused by errors in feeding and watering. The trouble often occurs through a bird having a large feed of wheat or other food while thirsty and then drinking. This causes the crop to be over-distended in such a manner that it fails to contract.

The trouble may also be caused through the turkeys being shut up at night and fed before they have access to water, or it may arise from indigestible food causing a gradual relaxation of the crop.

In any case the complaint is one which fails to respond to treatment, whereas if the turkeys were crop-bound they could be treated by opening the crop.

New Varieties of Wheat.

J. T. PRIDHAM, Plant Breeder.

THE work of cross-breeding and testing new varieties of wheat and of introducing and proving others likely to be suited to our conditions has been maintained, and as a consequence two varieties—Bomen and Sunset—recommended for further trial at the Conference of Departmental Officers in 1913, have fully justified that recommendation, while two others—Canberra and Nardoo—are suggested for further trial at the Experiment Farms.

New and introduced varieties are grown in the stud plots and compared with our standard varieties to determine their yielding qualities and to permit of an acquaintance with their defects and good points. A sample of any variety found promising in the field is sent to the Departmental Chemist to be milled and is recommended to farmers if it is found to yield a satisfactory flour; if it fails in this respect it is not included among the list of varieties recommended.

Bomen.

The young growth is medium spreading, of a dark-green colour, glaucous, and with erect leaves of medium breadth. The straw is fairly tall, hollow, white, rather strong and medium stout. Bomen is a medium stooler, even and level-headed in appearance, without much dead flag. The ears are rather large, smooth, medium erect, awnless, medium open, slightly tapering, and pale yellow in colour. The spikelets are regular and widely spreading, with rather blunt glumes which are not firmly attached. The grain is of medium size and regular shape, light red or brown, slightly horny with a medium deep crease. Its chief defects are a tendency to shell and a susceptibility to frost which sometimes induces tip-withering of the ear.

The cross was made at Wagga in 1901, and until fixed it was grown in the bunt experiment section, where it proved itself a resistant variety. In 1910 it was sown in larger plots, and it has yielded well since at Wagga, and has also done well at Cowra. It was not named until the Departmental Conference of 1913. Its pedigree is as follows:—

Jonathan × Zaff (an Indian variety)

Power's Fife (a Manitoba variety) × Unnamed

Red Potocka × Unnamed

Bomen

Bomen's season is about the same as Warren's, and it ripens a little later than Federation.

In the mill it is about equal to Warren, but it has a better straw than that variety. Its milling strength is about 47.

The quantity of seed available at present is limited.

Sunset.

The young growth is erect, with medium light green, moderately broad, leaves. The straw is below medium height, hollow, white, medium slender, and slightly brittle. Its stooling capacity is sparse, the flag is medium in amount and rather inclined to droop. The ears are rather erect, yellowish white, smooth, awnless, of medium size, fairly open, uniform, with widely-spreading spikelets. The glumes are sharp-pointed and sufficiently firmly attached. The grain is of medium size, soft, regular, pale yellow, medium opaque with medium deep crease. This variety usually lies between the medium strong and weak flour classes, and is the earliest wheat of the kinds recommended to ripen, thriving best in the Western Plains, where it yields satisfactorily for both hay and grain.

Its pedigree is as follows:—

Hornblende (White Fife) × Summer Club.

Sport from Blount's Lambrigg W (F) × Sunrise

Sunset

Canberra.

The young growth is rather erect, the leaves medium dark green, somewhat glaucous, and medium broad. The straw is of medium height, hollow, white, and rather slender. It stools medium profusely, with a moderate quantity of erect leaves. The ears are smooth, light brown, half erect, slightly awned at the tip, of medium length, open and uniform with an acute tip. The spikelets are irregular and medium to widely spreading with medium sharp-pointed glumes, which are not firmly attached. The grain is of medium size, slightly elongated, yellow, opaque, with a medium deep crease.

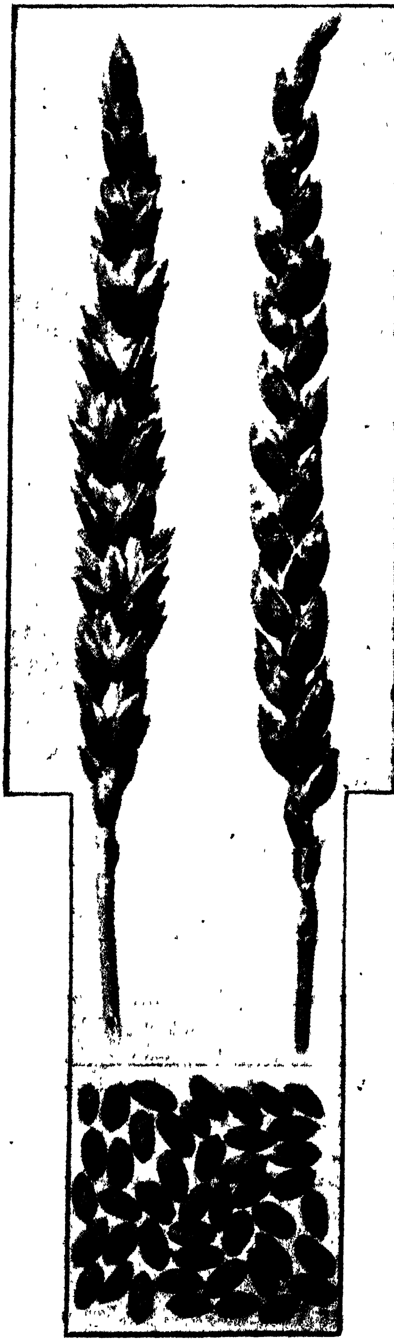
The variety is a cross between Federation (the dam) and Volga barley, a two-rowed sort obtained as an impurity in a sample of wheat received from Russia.

It ripens quite as early as Comeback and is specially suitable for grain production in the South-west Slopes and Riverina, also in the Central Western Slopes and Western Plains. A slight tendency to shell has been noticed and its barley parentage has made the straw somewhat weak, but it has stood up satisfactorily at the Wagga Experiment Farm, where it has yielded consistently well for the past four seasons.

It yields a high percentage of flour, which is of excellent colour and belongs to the medium strong class.

Nardoo.

The young growth is partly spreading, the leaves dark green, glaucous, and moderately broad. The straw is rather tall, hollow, white, medium strong and not coarse. It is a medium profuse stooler with fairly abundant flag. The ears are of medium size, smooth, medium erect, awnless, pale



Nardoo Wheat. Natural size.

yellow, medium open and tapering, with regular medium widely-spreading spikelets. The glumes are short, firmly attached, and blunt-pointed. The grain is of medium size, regular, pale yellow, medium horny, with a medium deep crease. It ripens at the same season as Bomen. Its pedigree is as follows :—

White Naples × Improved Fife
Unnamed × White Naples
Unnamed

Jonathan × Lambrigg White Essex
Unnamed

Unnamed × Unnamed
Nardoo

As a milling wheat it is classed with the medium strong varieties.

It is decidedly smut-resistant and an excellent hay wheat, though it may be recommended as a general purpose variety for the Central Tableland, the Northern Tableland, and the North-western Slopes.

Bomen. Natural size.

Sunset. Natural size.

New Varieties of Wheat.

The Identification of the Varieties of Wheat.

J. T. PRIDHAM, Plant Breeder.

THE "key" on the opposite page, which has been prepared at the suggestion and with the assistance of Mr. H. Wenholz, will be found useful in identifying each variety at a certain stage of its growth. It should be noted that by no means all the characters that separate the different varieties are taken into account, but only such as readily distinguish them. The complete difference between two varieties will be obtained by comparing their respective descriptions. It will usually be found that late maturing varieties have a creeping or spreading habit of growth, while early maturing wheats tend to grow erect.

Huguenot, although stooling sparsely and erect in habit of growth, is not among the early ripening wheats.

The colour of the leaves of wheat is influenced by the amount of organic matter in the soil and by the methods of cultivation practised, to some extent, but the comparative values still hold good. In droughty seasons the glaucousness of the plant, resembling the bloom seen upon grapes, is more pronounced than in favourable years. It is a characteristic of long season wheats, being seldom seen in early ripening, quick growing kinds.

Florence, in spite of the fact that it ripens early, differs from the early ripening wheats in its growth, being at first less erect, and its leaves of a dark green, glaucous colour.

Zealand, amongst the late ripening wheats, is distinguished from them by the leaves not being dark green and not glaucous.

The foliage colour is best seen in wheat when the plant is about 6 inches high; as it approaches maturity the colour tends to fade and become less distinct.

FARRER RESEARCH SCHOLARSHIP.

AT a meeting of the Trustees of the Farrer Memorial Fund, held at the Department of Agriculture on Monday, 16th February, it was decided to invite applications for the scholarship from young men who were willing to undertake two years research work in wheat breeding at one or more of the leading laboratories or experiment stations in Great Britain, Europe or America. The sum available for this purpose is sufficient to enable the scholar selected to devote the whole of his time and energies to the work.

Applications, which should be received not later than Monday, 6th April, should be addressed to the Chairman of Trustees of the Farrer Memorial Fund, Department of Agriculture, Sydney, from whom also further particulars with regard to the scholarship may be obtained.

Key to Identification of Varieties of Wheat Recommended to Farmers by the Department.

- **Young growth very erect**
  - Leaves very pale green ... ... Huguenot.
  - Leaves not very pale green
    - Leaves decidedly broad ... ... Firbank.
    - Leaves not decidedly broad
      - Ears slightly awned at the tip ... Bunyip.
      - Ears awnless ... ... Sunset.
- **Young growth neither distinctly spreading nor very erect.**
  - Leaves dark green and glaucous.
    - Early heading ... ... Florence.
    - Not early heading
      - Ears awnless
        - Grain white ... ... Bobs.
        - Grain light red ... ... Bomen.
      - Ears slightly awned at the tip ... ... John Brown.
  - Leaves not dark green and not or only slightly glaucous.
    - Ears awnless
      - Head brown when ripe ... ... Federation.
      - Head not brown when ripe.
        - Grain opaque and starchy ... ... Warren.
        - Grain translucent and horny.
          - Grain rather short ... Comeback.
          - Grain rather elongated Thew.
    - Ears awned at the tip ... ... Steinwedel.
- **Young growth distinctly spreading.**
  - Leaves dark green and glaucous.
    - Leaves very narrow ... ... Haynes' Blue Stem.
    - Leaves not very narrow.
      - Heads slightly compact at the tip ... ... Cleveland.
      - Heads not compact at the tip.
        - Straw decidedly purple ... ... Marshall's No. 3.
        - Straw not decidedly purple
          - Straw stout... Yandilla King.
          - Straw slender Rymer.
  - Leaves not dark green and not glaucous ... ... Zealand.

New Oats.

J. T. PRIDHAM, Plant Breeder.

AMONG the oats recommended for further trial at the Experiment Farms by the recent Departmental Conference are Sunrise and Guyra.

Sunrise.

This is a very early oat, ripening quite a week before Algerian. The straw is a foot taller than that variety and liable to lodge in some seasons, though of much the same stoutness as Algerian. It stools rather sparsely, and the grain is fairly long, greyish white, plump, with a thin husk. Sunrise is only recommended for the warmer districts and should not be sown so early as Algerian. It occupies a similar place among oats to Firbank among wheats.

It is a natural cross-bred from Algerian oats.

Guyra.

This matures at about the same season as Algerian, with straw about equal in height to that variety, not coarse but strong. It stools very fairly, and has a compact head with dark brown plump grain which has a fairly strong awn like its parent, White Ligowo. The grain is plump and husk not thick.

Guyra is suited to typical oat districts. It is a cross between Algerian and White Ligowo.

Humea elegans AS A SKIN IRRITATING PLANT.

(Previous reference, *Agricultural Gazette*, October, 1913, p. 916.)

THE Principal of a well-known Horticultural College in Victoria writes to me on the above subject :—

I have always read with interest your remarks from time to time on skin irritating plants, and in the October *Gazette* you refer to *Humea elegans*. I have handled this plant for years, both in the bush and in gardens, and never have previously suffered injurious effects.

However, yesterday (November 10) I was handling several plants, and before washing my hands they came in contact with my face. The result was most unexpected. In two or three hours time my whole face was red and swollen, and the feeling was very painful. I rubbed my whole face, head and neck with a soothing ointment, and thus was able to prevent the irritation spreading on to my body—both hands, too, became affected.

My face was painful all night, and this morning when I woke, my eyes were nearly closed. Even yet there is a good deal of swelling and irritation, and I shall be mighty careful before I bring my face either directly or indirectly in contact with this beautiful plant again.

It would seem to me that, provided we confine the handling to the hands, washing the hands well immediately afterwards, no results will follow. At the same time, I would suggest that the hands must be free from scratches and wounds, as in the present instance I had a scratch on both hands and face.—J. H. MAIDEN.

A New Oat—Sunrise—(a natural cross-bred from Algerian).

A New Oat—Guyra

The Treatment of Seed Wheat.

Recommendations for the Prevention of Bunt or Stinking Smut.

H. ROSS, Chief Inspector.

BUNT or stinking smut is the commonest trouble that the wheat farmer has to contend against, and is unfortunately an ever-recurring one

Various preventive methods have from time to time been employed, including hot water treatment, corrosive sublimate solution, formalin, and a host of proprietary preparations. Yet none of these have proved as efficient as the use of sulphate of copper or bluestone.

The success or otherwise of the bluestone treatment depends to a large extent upon the manner in which the operation is performed.

Dissolving the Bluestone.

$1\frac{1}{2}$ lb. of bluestone should be dissolved in every 10 gallons of water used, making a $1\frac{1}{2}$ per cent. solution. This is best done by tying the bluestone in a small hessian bag and suspending it in the water, allowing half the bag to be immersed in, and the other half to be out of, the water. In this way the bluestone will dissolve in a short time, whereas if the bluestone is thrown into the vessel containing the water, it will take a considerable time before it is entirely dissolved. Cold water serves this purpose well, and there is no need to use boiling water. On no account should the vessel holding the solution be of a metal other than copper, but the most useful one to use is a wooden cask.

Method of "Pickling."

The wheat to be pickled should be put in butts of not more than 1 bushel, immersed in the solution for three minutes, and vigorously shaken up and down; any unbroken bunt balls present will during this process come to the surface and should carefully be skimmed off. Vigorous shaking of the bag is essential, so that every grain may become thoroughly wetted. After three minutes' immersion, the butt is lifted on to a plank constructed of bark or a hollowed-out log and allowed to drain, the drained-off liquor flowing back into the cask. The writer has frequently noticed that galvanized iron is used to allow the butts of wheat to drain upon; this is entirely wrong, as the bluestone solution coming into contact with the galvanized iron loses the very properties which make it valuable for pickling. After draining for about ten to fifteen minutes the butt of wheat is put on one side, and will be ready for sowing the following day.

Lime Water.

The action of the bluestone during the process of pickling is that it kills the tiny spores or seed of the bunt which adhere to the outside of the grain. Now, while bluestone has the power to kill these spores it has also the power to impair the vitality of the grain, and even to kill the germ. To guard against this the following measures should be observed. If there is no prospect of immediate germination—that is, if a "dry" sowing is made, the bluestoned wheat should, after having been allowed to drain for from ten to fifteen minutes, be dipped into a solution of lime water, which is made by stirring *½ lb. of freshly burnt lime into 10 gallons of water. This mixture is allowed to settle; then the clear lime water is decanted, and into this the bluestone-treated seed is dipped for from two to three minutes. The lime neutralises the effects of the bluestone, and so preserves the full vitality of the wheat germ. If, on the other hand, a "wet" sowing is made, and an immediate germination of the seed is likely to follow, then there is little need to dip the bluestoned wheat into lime water.

When using lime water care should be taken to make a fresh mixture now and again, as the constant dipping of the bluestone saturated butts of wheat into the lime water will change this eventually from an alkaline into an acid solution, in which case it would be useless; and for that very reason bluestone and lime should never be mixed together in a solution used for pickling wheat.

The chief advantages gained from using lime water, in addition to bluestone, are: firstly, that a farmer following this practice is in a position to pickle all his seed wheat, say, in March, ready for sowing in April and May, without running any risk of the germination being affected; secondly, that a better germination will be obtained if the sown seed should lie in the ground for some time before rain falls and germination takes place.

Little extra trouble is involved in the bluestone lime treatment, and farmers are strongly advised to adopt this method in preference to the bluestone treatment only.

* Should it be found impossible to obtain freshly burnt lime it is recommended that ½ lb. of slacked lime be mixed with 10 gallons of water, thus making milk of lime, into which the butts of the bluestoned wheat should be dipped for a period of from two to three minutes.

Milk of lime differs from lime water in so far that in the former the particles of lime are not dissolved but held in suspension, whereas in the case of clear lime water the particles are dissolved.

Testing the Capacity of Pure-bred Cattle.

M. A O'CALLAGHAN.

As the scheme which was devised by the United Pure Breeders' Association, in conjunction with the officials of the Department of Agriculture, is growing older its value is attracting fairly wide attention. Not only is it receiving considerable notice locally, but it is attracting attention in such places as New Zealand, South Africa, and the East, which countries from time to time make importations of Australian cattle.

That a greater local interest is being shown in the work is evidenced by the fact that the dairy farmers on the Richmond and Tweed Rivers are anxious to avail themselves to the fullest extent of the benefits to be derived from a reliable and accurate method of testing the producing capacity of such pure bred cows as are owned on those rivers. With this object in view, a meeting was held at Lismore last month, at which representatives of the Tweed and Richmond Herd-testing Council, the Jersey Breeders' Association, and the Dairy Branch of the Department of Agriculture met in conference to see if a scheme could not be evolved which would enable pure-bred cattle on the Tweed and Richmond Rivers to be tested by the officials that are now doing the testing of the ordinary herds for the Tweed and Richmond Herd-testing Council.

The North Coast farmers interested in the subject are willing that such officials shall be appointed by the Department of Agriculture, or their appointments, where made, confirmed by that Department, and in addition that their work shall be supervised by the district Dairy Instructors. In other words, they are willing to have all precautions taken to safeguard the accuracy of the tests.

The value of this new development will be considerable if the details are such that they can be approved of by the United Pure Breeders' Association.

At the present time there are about 16,500 cows being tested by these herd-testing associations, and among these are a number of pure breds that are owned by farmers whose herds consist mainly of grade cattle, and needless to say these farmers are desirous of obtaining records from the pure breds in other herds that will be looked upon as absolutely authentic, and hence desire to fall in with the scheme of the United Pure Breeders' Association. Under the present arrangements such farmers, in order to have their pure-breds and cross-breds tested, would need to have two sets of officials testing them each month in order to get all their cows tested, namely,

the ordinary tester, who does the work for the local associations, to do the cross-breds, and the district Dairy Instructor of the Department to do the pure-breds.

This method would, needless to say, put the farmer to a good deal of extra expense and inconvenience, and it is to avoid such trouble that new proposals are being made.

Those interested in the scheme will attend the annual meeting of the Breeders' Association during Easter Show time in Sydney, and will lay their case before the Association in the hope that it will be adopted. The matter was brought before an executive meeting of the Pure Breeders' Association on the 9th of February, in Sydney, and the breeders, while welcoming anything which will facilitate the testing of larger numbers of cattle, state that whatever the scheme put forward, it would have to comply with the main conditions drafted in the original scheme which was worked out between the breeders and the officers of the Department of Agriculture.

A special feature of those original conditions is that the official who does the testing must see the cow milked out at the milking previous to that on which the test commences, whereas the recommendation of the Tweed and Richmond Herd-testing Council on this point is that the cows may be milked out in the presence of a neighbouring farmer specially selected for the purpose. This, it appears to me, is the only feature of any material difference between the new proposals and the old scheme, and this, judging by the meeting of the executive of the Breeders' Association, will have to be brought into line with the original conditions before the new proposals will be adopted by the Breeders' Association.

Under the new proposals, if carried, the owners of pure-breds who are having their entire herd, including cross-breds, tested would, it is estimated, be able to have their pure-breds tested at less expense than the 5s. per cow paid at present. Of course, any such scheme as this is only possible where there is a thoroughly organised and strongly supported herd-testing movement.

Further returns of cows tested under the Pure Breeders' Association scheme are given below.

The records of Mr. Manning's herd were put up during a very severe season in the Bega district. Under the conditions, the records obtained are very creditable indeed, and, given a good season, no doubt some exceptionally good records will yet be put up by these cattle.

The cow "Soprano" mentioned in the list was not well during the month of January, and her test was adversely affected thereby.

It will be satisfactory to the Queensland Government to note that the cow "Annette" put up such a satisfactory record despite an extreme season, as it will enhance the value of the young bull from this cow which I purchased for them about a year ago.

RECORDS of Mr. A. L. Manning's Jersey Herd at "Warragaburra," Bega.

Name of Cow.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last Day of Test. Milk.	Yield on last Day of Test. Butter.
	Years.		lb.	lb.	lb.	lb.
Solo	3	10 Aug., 1912	3,752	226	10	·66
Magnet's Lass II ...	5	10 Aug., 1912	5,255	322	18·5	1·47
Jessie's Progress III ...	7½	31 Aug., 1912	5,000	304	9	·68
Milkmaid 34th	9	22 Aug., 1912	3,931	225	10	·74
Viola	9¾	7 Sept., 1912	4,382	241	4	·29
Jessie's Starbright ...	4	13 Sept., 1912	5,187	320	11	·94
Mischief...	10½	13 Sept., 1912	4,765	278	8	·66
Soprano	3½	19 Sept., 1912	4,371	275	11·5	1·03
Melody	6½	21 Sept., 1912	4,643	266	5·5	·57
Milkmaid 36th	6¼	19 Oct., 1912	5,165	300	9	·60
Majesty's Dido... ...	4½	24 Oct., 1912	4,142	268	5·5	·49
Annette...	4½	29 Oct., 1912	4,678	320	6·5	·58
Miss Mischief	3½	1 Nov., 1912	3,871	251	5	·42
Dancing Girl II ...	7	7 Nov., 1912	4,846	291	10·5	·73
Juanita	3¼	19 Nov., 1912	3,681	236	10·5	·68
Molly Bawn 8th ..	6	26 Dec., 1912	4,479	293	14	·93
Leda's Antimony .	4	— Dec., 1912	4,372	278	9	·60
Nada	3¼	25 Jan., 1913	3,912	260	11	·77
Spinet	4¼	31 Jan., 1913	5,043	306	13·5	·82
Vanquish	2¾	30 Jan., 1913	4,363	266	15	·98
Rosebud	6¾	21 Jan., 1913	5,294	278	18·5	·98
Minx	4½	19 Jan., 1913	4,976	292	14·5	·94
Ballet Girl II	7½	12 Feb., 1913	5,248	336	25·5	1·84
Design	7	13 Feb., 1913	5,259	329	21	1·41
Carnation Columbus ...	5½	5 Feb., 1913	3,888	289	12·5	1·00
Rambler	4½	18 Mar., 1913	4,738	307	13	·97
Twinkling Star... ...	3¾	15 Feb., 1913	3,100	215	16·5	·99
Nina	4½	18 Mar., 1913	4,225	288	6·5	·51
Milkmaid 37th	5¾	14 April, 1913	5,639	330	5·5	·42
Queen of the Isles ...	5½	2 April, 1913	5,624	327	9·5	·64
Souvenir	4	3 April, 1913	3,924	265	10·5	·67

A Woodburn Jersey Herd.

Mr. Gollan is having tested about one hundred (100) cows altogether, and the first batch of records available is given herewith.

The performance of the cow "Winsome" is a remarkable one. Not only is this cow a good butter beast, but she is also, as shown by her milk yield, a very high class proposition as a cheese cow. Her record on the last day of the test showed that she is a very consistent milker.

The cow "Bessie" is also a very big yielder, both in milk and butter. Such records should attract considerable attention, as showing the possibilities of Jerseys on the Richmond River.

RECORD of Mr. O. H. Gollan's Jersey Herd at Woodburn, Richmond River.

Name of Cow.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last Day of Test.	
					Milk.	Butter.
	Years.		lb.	lb.	lb.	lb.
Winsome	8	24 Mar., 1913	8,106	481	23·0	1·39
Bessie	9	10 Apr., 1913	8,134	454	21·5	1·05
Dorothy	7	31 Mar., 1913	6,102	296	17·0	·89
Silver Maid III ...	7	4 Apr., 1913	5,253	278	13·0	·74
Milliner	7	11 Apr., 1913	6,131	355	17·25	·93
Chrysanthemum of Highfield	4½	8 Apr., 1913	3,902	219	9·0	·50
Dainty Annie	5	8 Mar., 1913	4,127	248	10·75	·66
Glory	4½	14 Mar., 1913	5,650	315	16·25	·92
Violets Silver	4	28 Mar., 1913	4,931	274	12·0	·75

Mr. O. H. Gollan's Jersey Cow, Winsome.

List of Fertilisers in New South Wales.

F. B. GUTHRIE AND A. A. RAMSAY.

1914 List.

THE accompanying list of manures obtainable in New South Wales, together with their composition, as guaranteed by the vendors, and their values, is the result of the revision of the list issued in April, 1913.

The list is published in the interest of the farmers, and it is hoped that it may serve as a guide to those requiring any particular class of manure.

It must be clearly understood that the figures given are not those obtained by analysis of the sample by the Department. They represent the guarantees given by the vendors in accordance with the provisions of the Fertilisers Act.

Where possible, samples have been taken from bulk by one of the officers of the Department, and only those manures are inserted in the list which have been found on analysis to be up to the guarantee.

A word is necessary in explanation of the column giving the "values" of the manures. These figures are calculated from the composition of the manures as represented by analysis, a definite unit-value being assigned to each of the fertilising ingredients. The units on which the values here given are computed are as follow:—

UNIT-VALUES of fertilising ingredients in different manures for 1914.

	Per unit. s.	d.
Nitrogen in nitrates ...	17	6
,, in ammonium salts ...	15	8
,, in blood, bones, offal, &c.—fine ...	15	7
Nitrogen in Nitrolim...	15	3
Phosphoric acid in bones, offal, &c.—fine ...	2	11
Phosphoric acid in superphosphate and mineral phosphate—		
Water-soluble ...	5	0
Insoluble ...	2	10
Potash in sulphate of potash ...	5	7

PRICE per lb. of fertilising ingredients in different manures for 1914.

	Pence per lb.
Nitrogen in nitrates ...	9·4
,, in ammonium salts ...	8·4
,, in blood, bones, offal, &c.—fine ...	8·3
Nitrogen in Nitrolim ...	8·2
Phosphoric acid in bones, offal, &c.—fine ...	1·6
Phosphoric acid in superphosphate and mineral phosphate—	
Water-soluble ...	2·7
Insoluble ...	1·5
Potash in sulphate of potash ...	3·0

To determine the value of any manure the percentage of each ingredient is multiplied by the unit-value assigned above to that ingredient, the result being the value of that substance in the ton of manure. For example, a bone-dust contains 4 per cent. nitrogen and 20 per cent. phosphoric acid:—

4 x 15s. 7d. = £3 2s. 4d. = value of the nitrogen per ton.
20 x 2s. 11d. = £2 18s. 4d. = value of the phosphoric acid per ton.

£6 0s. 8d. = value of manure per ton.

It must be clearly understood that the value thus assigned, depending solely upon the chemical composition of the manure, does not represent in all cases the actual money value of the manure, which depends upon a variety of causes other than the composition, and is affected by local conditions; neither does it represent the costs incurred by the manufacturer in the preparation, such as cost of mixing, bagging, labelling, &c., nor freight. It is simply intended as a standard by which different products may be compared. At the same time, it has been attempted to make the standard indicate as nearly as possible the fair retail price of the manure, and the fact that in the majority of cases the price asked and the value assigned are fairly close shows that the valuation is a reasonable one.

Some agents guarantee two figures—for instance, "from 16 to 18 per cent. phosphoric acid." In these cases the lower one has been published in the list, as it will certainly be the one the vendors will rely upon in cases of dispute.

Now that the Fertiliser Adulteration Act is in force, the purchaser has only himself to blame if he pays for an inferior article. Every vendor is obliged to furnish a guarantee with every delivery of fertiliser, setting forth its actual composition as determined by analysis.

If the purchaser has any reason to suspect the genuineness of the guarantee, all he has to do is to notify the vendor of his intention to take samples for analysis, in sufficient time to enable the vendor or some person appointed by him to be present. The samples must be taken before the consignment is finally in the purchaser's possession; for example, if the fertiliser is sent by rail, the sample should be taken at the railway station or siding. Three samples must be taken, one being given to the vendor or his representative, the second kept by the purchaser and submitted to an analyst, and the third forwarded to the Department of Agriculture for future reference, in case of divergence in the analyses of the other two. All three samples must be sealed up.

In the case of bone-dust, blood and bone manures, &c., the valuation has been made irrespective of the fineness of division, and is based on the amounts of fertilising ingredients only; but it must be borne in mind that finely ground bone-dust acts more rapidly than coarse, and that unground fragments of bone only become available as fertilisers very slowly.

A word may be added in explanation of the term "water-soluble phosphoric acid." When bones or mineral phosphates are acted on by sulphuric acid, a portion of the tricalcic phosphate is converted into another lime compound,

known as monocalcic phosphate or superphosphate. This compound is soluble in water, and it is to its presence that the rapid action of the phosphate is due. This is the "water-soluble" acid of the table. In many superphosphates, however, a considerable portion of this compound has undergone change. This change may be due to the salts of iron and alumina present, or to the length of time it has been kept, and it results in the formation of a third lime compound—bi-calcic phosphate. This is known as "reverted" or "retrograde" phosphoric acid, and is insoluble in water, but soluble in ammonium citrate.

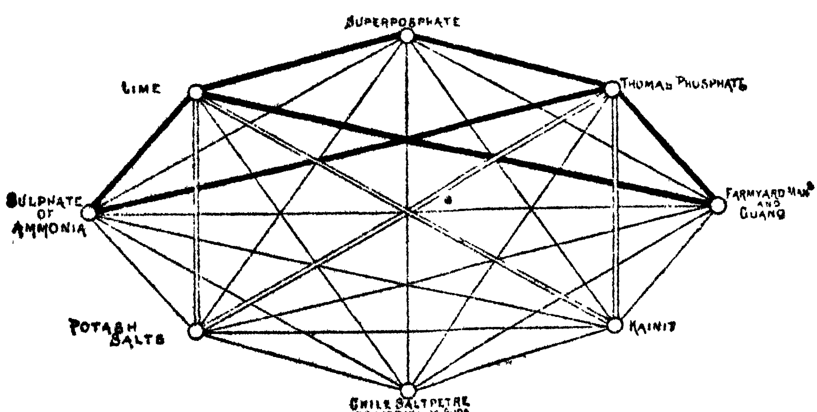
In the fourth table are a number of waste products which may in many cases be economically utilised.

When purchasing a manure, always insist on a guarantee of its composition as determined by analysis.

Artificial manures should be mixed with about three times their weight of dry loam, and distributed evenly.

Never add lime to a manure containing sulphate of ammonia or blood and bone manures, as in these cases loss of nitrogen results; and when lime has been applied to the land, do not use manures until about three weeks afterwards.

The accompanying fertiliser diagram, which represents in a graphic manner the points to be taken into consideration in the mixing of different manures, is reproduced in the hope that it will be found useful to farmers who make up their own mixtures. The diagram originates with Dr. Geekens, Alzey, Germany, and is taken from an article by Mr. Leo Buring, in the *Garden and Field* of 10th October, 1903.



Substances connected by thick line must not be mixed together.
Substances connected by double line must only be mixed immediately before use.
Substances connected by single thin line may be mixed together at any time.

I.—Simple Fertilisers.

Manure.	Where obtainable.	Guaranteed Composition. Nitrogen.	Equal to Ammonia.	Lime.	Potash.	Phosphoric Acid	Manurial Value. £ s. d.
Sulphate of ammonia	Australian Gaslight Co., Kent-street	20·4	24·8	......	......	......	15 19 7
" "	Geo. Shirley, Ltd., 18 22 Carrington-street	20·0	24·29	......	......	......	15 13 4
Kainit	" "	......	......	......	12·5	......	......
Sulphate of potash	" "	......	......	......	52·0	......	14 10 4
Thomas' phosphate	" "	......	......	......	......	17·0	......
Nitrolim	" "	18·0	21·86	......	......	......	13 14 6
Nitrate of soda	" "	15·5	18·82	......	......	......	13 11 3
Sulphate of ammonia	Farmers' Fertilisers Corporation, Ltd., 31 Hunter-street.	20·4	24·8	......	......	......	15 19 7
Nitrate of soda	" " "	15·9	19·31	......	......	......	13 18 3
Nitrolim	" " "	18·0	21·86	......	......	......	13 14 6
Sulphate of potash	" " "	......	......	......	53·0	......	14 15 11
Gypsum fertiliser	" " "	......	......	96% Cryst. $CaSO_4$	......	......	......
Thomas' phosphate	" " "	......	......	......	......	18·0	......
Sulphate of potash	Gibbs, Bright, & Co., 37 Pitt-street	......	......	......	52·0	......	14 10 4
Nitrate of soda	" "	16·0	19·43	......	......	......	14 0 0
Sulphate of ammonia	Paton, Burns, & Co., 75 York-street	20·4	24·8	......	......	......	15 19 7
Kainit	" " "	......	......	......	12·8	......	......
Sulphate of potash	" " "	......	......	......	52·0	......	14 10 4
Thomas' phosphate	" " "	......	......	......	......	18·0	......
Nitrate of soda	" " "	15·5	......	......	......	......	13 11 3
Gypsum	" " "	......	......	96% Cryst. $CaSO_4$	......	......	......

II.—Bone and Blood Manures.

Manure.	Where obtainable.	Guaranteed Composition.				Manurial Value.
		Nitrogen.	Equal to Ammonia.	Phosphoric Acid.	Equal to Tricalcic Phosphate.	£ s. d.
Blood and bone manure	Kitchen & Sons, Ltd., 365 Kent-street	5·0	6·07	17·0	37·11	6 7 6
White bone-dust	" "	3·5	4·25	25·0	54·58	6 7 5
Special fertiliser	Co-operative Wholesale Society, Ltd., Alexandria	5·5	6·68	17·0	37·11	6 15 3
Excelsior bone-dust	M. Gearin, Old Botany road, Mascot	3·7	4·49	23·47	51·29	6 6 1
Phosphatic bone-dust	The Wooster Fertiliser Co., Alexandria ...	3·3	4·0	20·61	45·00	5 11 6
Pure steamed bone-dust ..	" " " ...	3·91	4·75	24·50	53·50	6 12 5
Bone and blood fertiliser	" " "	5·76	7·00	13·74	30·00	6 9 10
Raw or green bone-dust ...	" " "	4·01	4·86	24·41	53·30	6 13 8
Bone-dust ⁂	R. S. Lamb & Co., 55 Pitt-street	3·91	4·75	22·90	50·00	6 7 9
" A1	" " "	4·12	5·00	19·24	42·00	6 0 4
Vulture	" " " ...	3·30	4·00	18·32	40·00	5 4 10
Sandown bone and blood manure ...	John Cooke & Co., Prop. Ltd., Sandown Freezing Works	6·85	8·32	10·44	22·82	6 17 2
Bone-dust	Geo. Shirley, Ltd., 18–22 Carrington street	3·7	4·49	21·9	47·81	6 1 6
Bone and blood	" " "	5·5	6·68	17·0	37·11	6 15 3
Bone and blood	J. Barnes, Granville South	5·21	6·32	15·74	34·36	6 7 1
Bone and blood ...	Silvester Bros., Regent street, Redfern	3·95	4·80	18·30	39·95	5 14 11
Blood	B. Richards and Sons, Ltd., Riverstone	13·7	16·64			10 13 6
Bone-dust	" " "	3·17	3·85	26·78	58·46	6 7 6
Bone and blood	Farmers' Fertilisers Corporation, Ltd., 31 Hunter-street.	4·91	5·96	18·0	39·30	6 9 0
Bone-dust, B.D.1	Paton, Burns, & Co., 75 York-street	3·7	4·5	22·12	48·29	6 2 2
" B.D.2	" " "	3·7	4·5	22·12	48·29	6 2 2
" B.D.3 ..	" " "	3·3	4·0	20·7	45·19	5 11 10
" B.D.4 ...	" " "	3·3	4·0	18·4	40·17	5 5 1
Bone and blood, B.B.1	" " "	5·7	6·92	18·0	39·5	7 1 4
Bone-dust	M. O'Riordan, O'Riordan road, Alexandria	3·84	4·66	21·50	46·94	6 2 7

III.—Superphosphates, Mixed Fertilisers, and Imported Fertilisers.

Manure.	Where obtainable.	Guaranteed Composition. Nitrogen	Water soluble Phosphoric Acid	Total Phosphoric Acid	Potash	Manurial Value. £ s. d.
Superphosphate No. 1	George Shirley, Limited, 18-22 Carrington-street		17·00		...	4 5 0
,, No. 2	,, ,, ,,	1·6	15·00		1·00	5 5 6
,, No. 3	,, ,, ,,	3·3	13·0	..	2·0	6 7 10
,, No. 5	,, ,, ,,	3·3	12·0		7·0	7 10 9
,, No. 7	,, ,, ,,	1·6	11·4		1·0	4 7 8
,, No. 9	,, ,, ,,	4·1	6·5		4·0	5 19 1
,, No. 11	,, ,, ,,		11·4		7·0	4 16 1
,, No. 12 ..	,, ,, ,,	3·3	5·5	14·6	2·0	5 16 2
,, No. 14	,, ,, ,,	2·5	5·5	14·2	6·0	6 4 10
,, No. 18 ...	,, ,, ,,		5·5	14·2	6·0	4 5 8
,, No. 19	,, ,, ,,	4·1	4·1	11·4	2·0	5 16 7
,, A	,, ,, ,,	0·5		29·8		4 14 8
,, M ..	,, ,, ,,	1·6		16·0	1·0	3 17 4
,, N	,, ,, ,, ..	1·6		16·0	4·0	4 14 1
,, O	,, ,, ,,	2·5		13·7	6·0	5 12 7
Government P4 mixture	,, ,, ,,	4·0	11·0		7·85	8 1 6
,, P5 ,,	,, ,, ,,		13·6		10·4	6 6 1
,, M5 ,,	,, ,, ,,	6·6	11·3		...	7 19 11
Superphosphate	Paton, Burns, & Co., 75 York-street		17·00			4 5 0
Bone Phosphate	,, ,,			29·77	.	4 6 10
Guano	,, ,,			27·48	.	3 17 10
Complete Mixed Manures. P.B.1	,, ,,	4·3	4·25	9·75	5·0	6 12 1
,, ,, P.B.2	,, ,,	3·75	4·25	9·75	7·1	6 15 3
,, ,, P.B.3	,, ,,	3·4	5·1	9·0	7·1	6 9 5
,, ,, P.B.4	,, ,,	3·3	2·75	9·65	7·1	6 4 8
,, ,, P.B.5	,, ,,	4·3	4·25	9·75	2·4	5 17 7
,, ,, P.B.6	,, ,,	3·3	6·0	12·68	2·4	5 14 0
,, ,, P.B.7	,, ,,	1·7	6·8	13·47	1·2	4 6 3
,, ,, P.B.8	,, ,,	0·82	8·5	10·8	7·1	5 1 6

III.—Superphosphates, Mixed Fertilisers, and Imported Fertilisers—*continued.*

Manure.	Where obtainable.	Guaranteed Composition. Nitrogen.	Water soluble Phosphoric Acid.	Total Phosphoric Acid.	Potash.	Manurial Value. £	s.	d.
Complete Mixed Manures, P.B.9	Paton, Burns, & Co., 75 York-street	2·47	....	9·0	4·9	4	12	4
" " P.B.10	" "	2·47	....	10·5	4·9	4	16	8
" " P.B.11	" "	2·47	....	10·5	2·4	4	2	9
" " P.B.12	" "	1·6	....	14·9	0·6	3	11	10
" " P.B.13	" "	....	....	12·0	7·1	3	14	8
Sulphide Superphosphate	Gibbs, Bright, & Co., 37 Pitt-street	....	17·00	....	....	4	5	0
Nitro "	" "	1·6 *a*	15·90	....	....	5	0	0
No. 1 Bone "	" "	1·5	8·5	19·0	....	4	16	6
No. 2 " "	" "	0·8	13·0	19·0	....	4	15	0
Potato manure	" "	1·25	14·5	16·0	4·20	5	19	9
Orchard "	" "	2·30	13·0	14·5	7·25	7	5	9
Maize and fodder crop manure	" "	3·00 *b*	11·00	14·0	1·00	5	16	11
Root crop manure	" "	3·25 *c*	7·50	10·0	4·75	6	1	11
Leguminous	" "	....	15·50	18·0	2·65 *d*	4	18	6
No. 1 Superphosphate	Farmers' Fertilisers Corporation, Ltd., 31 Hunter-st.	....	17·0	....	....	4	5	0
A1 "	" " "	....	20·0	....	....	5	0	0
Bone "	" " "	1·5	9·0	20·5	....	5	1	11
Nitro "	" " "	1·35	15·44	19·05	....	5	8	7
A1 Cane manure	" " "	11·00	4·00	4·00	9·0	12	2	7
Special Crookwell Potato manure	" " "	2·75	7·0	17·0	....	5	6	5
Special Potato Fertiliser	The Wooster Fertiliser Co., Alexandria	4·52 *e*	....	14·91	5·00	7	1	11
Complete Fertiliser	" " "	5·01 *f*	....	14·56	2·00	6	11	10

a Containing 1 % ammoniacal nitrogen, 0·6 % organic nitrogen. *b* Containing 2 % ammoniacal nitrogen, 0·5 organic nitrogen, 0·5 % nitric nitrogen.
c Containing 2 % ammoniacal nitrogen, 1·25 % organic nitrogen. *d* Containing 1·5 K_2O as sulphate, 1·15 K_2O as muriate.
e Containing 3·77 % organic nitrogen, 0·75 % ammoniacal nitrogen. *f* Containing 3·81 organic nitrogen, 1·20 % ammoniacal nitrogen.

IV.—Waste-Products, Ashes, &c., not on the Market.

*Manure.	Original Source.	Water.	Volatile and Combustible.	Nitrogen.	Ammonia.	Insoluble	Lime.	Phosphoric Acid.	Potash.	Value.
										£ s. d.
Deposit from wool-scouring tanks. (1)	Liverpool Wool-scouring Works.			·61	·78				·72	0 14 0
,, (2)	,, ,, ,,			1·02	1·24			·16	·39	0 18 6
,, (3)	,, ,, ,,			1·37	1·66			·14	·20	1 2 10
Deposit from breakers	,, ,, ,,	34·47		1·81	2·20	50·68	·85	·88	1·60	1 19 8
Sediment from wool-scouring works.	Yass	19·57		·59	·71	78·24	·97	..	·20	0 10 3
Scutch	Australian Glue-Gelatin Works, Alexandria.	56·98		2·95	3·58		4·56	None.	None	2 6 0
,, from limed pelts	Hugh Wright, Auburn	5·32	73·42	1·80	2·18	3·61	9·36	·89	·20	1 11 8
Decomposed hair and lime	Fellmongery	9·70	57·08	6·86	8·33	1·22	26·27			5 7 0
Tan-yard refuse	Tanneries, St. Mary's	6·43	33·83	2·24	2·72	21·43	26·96	·67		1 16 10
Tan refuse		7·10	50·90	2·62	3·18	16·03	18·58	·56	·18	2 3 5
Fleshings from tannery		·91	75·37	4·43	5·38	5·98		1·14	·04	3 12 6
Salt (sweepings from tannery)		3·04		·70	·85	·38				0 10 11
Wool-waste				8·15	9·89					6 7 0
,,		34·33	28·20	1·97	2·39	26·03	2·75	·37	·32	1 13 6
Peat	H. Tager, Moss Vale	72·93	16·68	·35	·42	10·39 (ash).				0 5 5
,,	S. Cook, Pyrmont	49·51	34·63	·75	·91			·06	·01	0 11 11
Burnt peat						84·45		·25	·33	0 2 7
Filter-press muck	Cane-mills, Broadwater	16·39	26·07	·22	·27	34·86	13·20	5·98	·44	1 2 10
Megass	Clarence River cane	22·86	67·32	·63	·75	8·61	·30	·01	·05	0 10 1
Megass ash	,, ,,					87·60	3·07	·16	·51	0 3 4
,,	Richmond River cane						1·11	·21	4·79	1 7 4
Bloodwood ash							8·47	·27	5·25	1 10 0
Ironbark ash								·82	1·53	0 10 10
Blackbutt ash							7·27	·04	2·02	0 11 5
Red-gum ash								·38	4·17	1 4 4
Spotted-gum ash								·10	·70	0 3 11
Boxwood ash								·67	1·65	0 11 1
Grass-tree ash		·86	1·78			33·48	24·94	3·07	5·30	1 18 3
Vine-cuttings ash		·49				60·64	11·34	1·85	3·76	1 6 3
Red-apple ash						54·52	13·36	·47	6·00	1 14 10
She-oak ash						8·57	42·35	8·85	2·19	1 17 4
Hardwood ash		·50	1·35			62·38	13·50	1·76	3·09	1 1 6
Ash of wild melon	Stock Branch						5·12	4·85	27·08	8 4 11
Wood ashes		·30				21·43	41·37	·35	2·80	0 16 7
,,	Wentworth Irrigation Area					11·12	50·78	·53	3·21	0 19 7
Ash of kerosene shale	Hartley Vale	1·49	27·93	·70	·85	67·59		·28	·14	0 12 6

IV.—WASTE-PRODUCTS, ASHES, &c., NOT ON THE MARKET—*continued.*

Manure.	Original Source.	Water.	Volatile and Combustible.	Nitrogen.	Ammonia.	Insoluble.	Lime.	Phosphoric Acid.	Potash.	Value. £ s. d.
Clinker from locomotive boiler ..	....	......	......	......	......	......	......	......	·25	0 1 5
Residue from furnace	R. E. Bragg, Marrickville	1·55	35·63	·54	·61	52·40	·64	·43	·09	0 10 2
Sea-weed ash	....	......	......	......	......	......	9·27	·49	·69	0 4 8
"	....	......	......	......	......	......	6·29	1·27	17·56	5 1 7
"	....	·43	......	......	......	56·28	9·39	·47	2·26	0 13 6
"	Manly	......	......	......	......	43·06	6·52	·91	13·98	4 0 2
"	"	......	......	......	......	·07	·53	·19	34·30	9 11 11
"	Mr. Harvey, Department	3·25	19·46	......	......	61·63	4·22	·33	·22	0 2 2
Sea-weed, fresh state	....	80·00	......	·16	·19	......	·41	·09	1·18	0 9 4
Sea-weed	....	41·03	42·49	·14	·17	......	......	·21	·80	0 6 1
Sea-weed, dried	....	18·58	65·97	1·64	1·99	15·44 (ash).	3·44	·14	·14	1 6 9
Air-slacked lime	....	16·58	......	......	......	1·88	75·44	......	......	......
Residue from calcium carbide ..	....	41·36	......	......	......	1·08	86·19	......	......	......
Limestone rock	Queanbeyan ..	1·10	.	......	......	4·70	48·20	1·22	......	0 3 5
Agricultural lime	Portland Cement Co.	18·43	......	......	......	23·80	Hydrate 13·80 Carbonate 13·97	......	......	......
Gypsum	Marulan ..	(Crystallised $CaSO_4$ = 92·64)				4·47	..	......	......	......
Cave deposit, shells, &c. ..	Cowan, Hawkesbury River	2·11	.	·82	1·00	......	35·40	1·59	·88	1 2 2
" "	Macleay River ..	23·06	16·01	2·43	2·95	26·77	13·88	7·40	......	2 0 0
Deposit (coral, shell, &c.) ..	Pacific Islands ..	2·13	13·53	·72	·87	......	44·00	3·53	·39	1 3 5
Shells	Pambula River ..	......	......	......	......	......	44·59	·10	......	......
Flue deposit	Maitland	......	......	......	...	83·75	2·56	·32	·31	0 2 8
"	Liverpool	......	......	......	...	91·17	·42	1·29	·17	0 4 6
" from sanitary furnace	....	......	......	......	......	63·53	6·64	1·82	1·61	0 14 2
"	....	6·30	2·45	......	......	84·89	·32	·35	·38	0 3 2
Night-soil mixed with lime ..	....	44·33		·74	·89	18·60	7·62	·78	......	0 13 9
Night-soil	Wagga Wagga ..	6·70		·03	·04	82·19	·44	·28	·69	0 5 1
"	" ..	9·14		·28	·34	78·92	1·18	·18	·54	0 7 11
"	" ..	...		·50	·61	......	......	·64	·62	0 13 0
Night-soil preparation, No. 1	....	8·22		3·73	4·63	50·22	13·32	9·65	·91	4 10 6
" " No. 2	....	7·20		1·83	2·22	29·02	8·05	4·10	·15	2 1 0
" " No. 3	....	25·95		1·64	1·90	60·17	1·39	1·61	·70	1 14 0
" preparation, "Pinhoe" manure.	....	·92	9·54	·21	·25	57·58	14·71	1·26	56	0 10 0
Night-soil preparation ..	F. Artlett, Parramatta	7·33	30·06	2·10	2·55	46·38	2·09	1·92	·61	2 1 7
" "		10·11	42·59	4·97	6·03	·94	30·12	·39	.	3 18 7
" "	Mr. "Halstead," O'Brien's patent.	1·54	12·36	·54	65	77·95	......	·63	......	0 10 5
" "	....	29·52	56·15	2·55	3·10	14·33 (ash).	. .	.	......	1 19 9

IV.—Waste-Products, Ashes, &c., not on the Market—*continued.*

Manure.	Original Source.	Water.	Volatile and Combustible.	Nitrogen.	Ammonia.	Insoluble.	Lime.	Phosphoric Acid	Potash	Value.
										£ s. d.
Farmyard manure ..	....	67·96	22·00	·40	·49	8·16	·16	·20	·30	0 8 5
Stable manure ..	Bathurst ..	39·26	..	·41	·50	....	......	·27	·67	0 10 11
Fowl manure ..	....	3·95	16·48	1·47	1·78	70·16	2·10	1·94	......	1 8 5
" ..	....	1·54	15·23	·86	1·04	79·96	·64	·59	·33	0 16 11
Sheep manure ..	Bathurst ..	7·73	....	1·06	1·30	....	..	·69	1·17	1 5 0
" ..	Liverpool Wool-scouring Works.	9·71	50·91	1·79	2·17	32·28	2·00	·91	·92	1 15 7
Sheep dag	....	......	..	3·04	3·69	..	...	.....	.....	2 7 4
Refuse manure	Abattoirs ..	12·00	74·51	4·14	5·03	6·56	....	1·80	..	3 9 7
Flying-fox manure	....	1·09	35·34	3·34	4·05	50·29	1·02	·36	1·15	2 19 6
Fish fertiliser	....	14·47	64·36	10·37	12·59	4·52	...	...	.....	8 1 7
Shark fertiliser	....	9·02	68·04	10·59	12·85	3·86	....	7·27	...	9 5 7
Fish manure ..	....	10·88	59·26	6·10	7·40	5·39	9·82	8·28	.....	5 18 6
Rabbit hair, long ..	Anderson, Oxford-street ..	8·73	88·64	14·03	17·04	3·63 (ash).	....	....	....	10 18 8
" short ..	" "	9·72	87·76	14·00	17·00	2·82 (ash).	....	....	....	10 18
Bat-guano ..	....	14·11	17·69	1·55	1·88	28·77	13·72	11·42	......	2 16 6
" ..	....	10·86	19·65	2·24	2·72	51·95	1·75	3·55	·15	2 5 10
" ..	....	13·70	24·35	4·76	5·78	3·30	22·28	13·04	trace.	5 11 1
Bat deposit ..	Cave Flat, Cooradigbee	5·43	12·98	·50	·61	17·64	5·60	12·12	..	2 2 1
Guano deposit	Tamworth	8·75	38·40	6·17	7·49	12·85	...	9·24	...	6 2 4
" " ..	" ..	8·42	20·97	3·10	5·76	31·89	.	7·87	....	3 10 7
" " ..	" ..	14·55	29·91	3·66	4·44	15·81	..	12·98	....	4 13 10
" " ..	" ..	9·35	44·32	6·73	8·17	7·33	...	13·17	....	7 2 2
Bone breccia	Queanbeyan	5·71	....	·59	·72	9·48	42·80	3·11	....	0 18 0
Muck from waterworks reservoir	Maitland ..	4·84	17·55	·74	·90	63·42	4·56	·31	·60	0 15 9
Muck raked from waterhole	....	63·66	29·86	·81	·98	3·80	·96	·10	·06	0 12 3
Sawdust ..	....	32·52	62·35	·82	1·00		..	1·70	·05	0 17 10
Decayed wood, bark and leaves, bloodwood.	....	57·80		·74	·89	40·68	1·30	......	......	0 11 6
Decayed wood, bark and leaves, pepper-tree.	....	79·92		·89	1·08	17·77	1·50	......	......	0 13 10
Coco-nut oil cake ..	....	8·24	....	3·29	3·99	...	....	1·20	1·49	3 3 0
Castor cake ..	....	18·81	74·08	4·30	5·22	...	......	1·83	·86	3 17 0
Pea cake ..	Java ..	16·02	.....	7·24	8·79	...	.....	1·46	1·17	6 3 6
Bean cake ..	North China ..	14·52	80·32	6·77	8·22	....	......	1·33	1·99	6 0 4
Rice husks ..	....	42·74	42·15	1·07	1·30	13·77	·02	·03	·04	0 17 0
Field pea, whole plant ..	....	88·58	9·97	·55	·67	......	·15	·12	·49	0 11 8
Tares, whole plant ..	....	83·97	14·96	·73	·88	......	....	·11	·21	0 12 10
Marsh mallow, whole plant ..	....	79·00	17·86	·85	1·03	....	....	·14	·69	0 17 6
Horse bean, leaves and stalks ..	....	82·87	15·90	·90	1·09	.....	·95	·11	·54	0 17 4

Seasonable Work for Poultrykeepers.

JAMES HADLINGTON.

MARCH.

By the end of this month, or at latest early in April, all well-developed pullets that are likely to prove winter layers should, if possible, be settled in the positions they are to occupy during the winter, more particularly if large numbers are being handled. The small numbers are not nearly so much affected in this way as are large flocks; but if the latter are disturbed at the commencement of the cool weather it is almost sure to result in disaster to winter laying prospects. This means so much to the poultry-keeper that he cannot afford to take risks, seeing that every egg obtained from April to July is worth three laid at some other periods of the year. The same applies in regard to the breeding stock. These, too, should be settled in their quarters for the same reason. It will be found difficult enough to secure eggs for setting in sufficient quantities, even under the most favourable conditions, without disturbing the fowls in winter. It should be remembered that very little will put fowls off laying in cold weather, and it is often very difficult to bring them on again until the warm weather sets in.

New Stock.

Where new stock is to be brought in, from the middle of March to the end of May is the best time to secure them. Better selections of forward stock can be made while stud breeders have the bulk of their previous hatching season's stock to choose from. In choosing breeding stock, no less than layers, the heavy breeds, such as Orpingtons of July and August hatching, and Leghorns of August and September hatching, are likely to give the best results in chickens from June. The difficulty in connection with breeding from aged birds is that the hens are not always to be depended upon to lay early enough to secure early chickens. Then, in regard to the aged males, there are often difficulties in securing a good percentage of fertility so early. These are the considerations that face the purchaser of stock, and any attempts to dogmatise on the ages to mate must be modified in the light of the above; but it may be pointed out that birds hatched in July, August, and September, if well developed specimens, are quite fit to breed from from June the following season, and if not well developed they should not be chosen as breeders at all.

Autumn Troubles of Growing Stock.

The absence of winds and the close, muggy conditions usually prevailing during February and March, added to the lowering effect of the summer

upon the vitality of the stock, predisposes them to numerous diseases that flourish at this time of the year. This will be more noticeable with late hatched chickens (meaning chickens hatched between September and December). These are the greatest sufferers during the autumn months. It will have been noticed that during the months January to March much less growth is obtained than with the earlier hatches. This stunted growth portrays also loss of stamina, and thus, these late hatched chickens, especially if kept in large numbers, fall victims to autumn diseases, particularly chicken-pox, or so-called warts, if they have not been protected as advised in the January notes.

How to Treat Chicken Pox.

Upon the first signs of the outbreak of this disease, the treatment recommended in the notes referred to should at once be given, and in rather larger doses, or more frequently, for about three weeks. The disease will, however, run its course once it has broken out; but its severity might be modified on the ones taking it later. As soon as the sores appear, the main thing is to dry them up. For this purpose they may be painted with tincture of iodine, or dressed with the following ointment once a day, taking care to use it lightly:—

Carbolic acid, 1 drachm.
Flowers of sulphur, 2 drachms.
Tincture of iodine, ½ ounce.
Vaseline, ½ ounce.

This will allay the itching irritation which causes the fowl to scratch the sores, and thus spread them all over the face, head, and comb. The sores spreading around the eyes and beak are responsible for most of the losses, owing to their preventing the birds feeding. It should be understood that starvation, and not the disease itself, is responsible for most of the deaths in this disease. The loss occasioned by an outbreak of chicken-pox is not only the actual loss by death, but it will ruin all prospects of winter eggs from the pullets attacked, because, after having had this disease, they usually break up, go into half a moult, and there is very little prospect of their being much good as layers until the spring.

Overcrowding.

No overcrowding, particularly of young birds, should be permitted, and roosts should be kept a fair distance apart. Close packing into ill-ventilated houses is one of the most prolific sources of catarrh and roup. At this season of the year special precautions are necessary to prevent an outbreak. Cleanliness alone, while commendable and necessary, will not in itself keep away roup. Preventing overcrowding in ill-ventilated quarters and keeping the birds in robust health are the only safeguards against it.

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

Branch.	Honorary Secretary.
Albury	Mr. J. D. Lankester, Albury.
Baan Baa	Mr. P. Gilbert, Baan Baa.
Balldale	Mr. H. Elrington, Balldale.
Bathurst	Mr. J. McIntyre, Orton Park.
Batlow	Mr. A. C. Arnot, Batlow.
Beckom	Mr. S. Stinson, Beckom.
Bonville	Mr. H. B. Faviell, Bonville.
Borambil	Mr. H. A. D. Crossman, "Homewood," Quirindi.
Bungalong	Mr. G. H. Pereira, "Springdale," Cowra Road, *viâ* Cowra.
Canadian	Mr. C. Smith, Canadian Lead.
Cardiff	Mr. F. B. Cherry, Cardiff.
Carlingford	Mr. D. K. Otton, Carlingford.
Cattai	Mr. A. J. McDonald, Cattai, Pitt Town.
Collie	Mr. C. J. Rowcliff.
Coonabarabran	Dr. F. G. Failes, Coonabarabran.
Coradgery	Mr. J. Clatworthy, Beechmore, Millpose, Parkes.
Coreen-Burraja	Mr. N. B. Alston, Coreen, *viâ* Corowa.
Cowra	Mr. E. P. Todhunter, Cowra.
Crudine	Mr. F. W. Clarke, Crudine.
Cundletown	Mr. S. A. Levick, Roseneath, Cundletown.
Deniliquin	Mr. W. J. Adams, jun., Deniliquin.
Derrain	Mr. A. P. Hunter, Red Bank Creek. Matong.
Dubbo	Mr. T. A. Nicholas, Dubbo.
Dunedoo	Mr. G. E. Alexander, Dunedoo.
Erudgere	Mr. Frank Hughes, Erudgere.
Fernbrook	Mr. W. Marks, Yarrum Creek, Dorrigo.
Forest Creek	Mr. W. Thompson, Forest Creek, Frogmore.
Garra and Pinecliff	Mr. A. S Blackwood, "Netherton," Garra, *viâ* Pinecliff.
Gerringong	Mr. J. Miller, Gerringong.
Grenfell	Mr. G. Cousins, Grenfell.
Gunning	Mr. E. H. Turner, Gunning.
Henty	Mr. H. W. Smith, Henty.
Hillston	Mr. M. Knechtli, Hillston.
Inverell	Mr. W. A. Kook, Rock Mount, Inverell.
Jerrara	Mr. A. O. Lane, Public School, Mullengrove, Wheeo.
Jiggi	Mr. D. Gibson, Daru Farm, Jiggi.
Jindabyne	Mr. Sylvester Kennedy, Jindabyne.
Katoomba	Mr. C. Wooller, Oliva Park Farm, Katoomba.
Keepit, Manilla	Mr. J. B. Fitzgerald. Keepit, *viâ* Manilla.
Kellyville	Mr Joseph Nutter, Kellyville.
Kenthurst	Mr. J. R. Jones, Kenthurst.
Leech's Gully	Mr. J. Donnelly, Leech's Gully, Tenterfield.
Leeton	Mr. C. Ledwidge, Farm 442, Leeton.
Little Plain	Mr. F. S. Stening, Little Plain, *viâ* Inverell.
Lower Portland	Mr. W. C. Gambrill, Lower Portland.
Mangrove Mountain	Mr. G. T. Hunt, Mangrove Mountain, *viâ* Gosford.
Martin's Creek	Mr. P. Laney, Martin's Creek, *viâ* Paterson.
Middle Dural	Mr. J. W. Thacker (*pro tem*), Middle Dural.
Milbrulong	Mr. O. Ludwig, Milbrulong.
Moruya	Mr. P. Flynn, Moruya.
Narellan	Mr. G J. Richardson, Narellan.
Narrandera	Mr. C. F. Pearce, Narrandera.
Nelson's Plains	Mr. V. Schlaadt, Nelson's Plains
New Italy	Mr. F. A. Morandini, New Italy.
Nimbin	Mr. J. H. Hutchinson, Nimbin.
Orangeville	Mr. C. Duck, Orangeville.
Orchard Hills (Penrith)	Mr. H. Basedow, Orchard Hills, *viâ* Penrith.
Parkesbourne	Mr. W. H. Weatherstone, Parkesbourne.

Branch.	Honorary Secretary.
Peak Hill	Mr. A. B. Pettigrew, Peak Hill.
Penrose-Kareela	Mr. A. J. Bennett, "Brookvale," Kareela.
Ponto	Mr. A. D. Dunkley, Ponto.
Redbank	Mr. J. A. Graham, Woodlands, McAlister, *via* Goulburn.
Ringwood	Mr. Wm. Tait, Ringwood.
St. Mary's	Mr. W. Morris, Queen and Victoria Streets, St. Mary's.
Sackville	Mr. Arthur Manning, Sackville.
Sherwood	Mr. J. E. Davis, Sherwood.
Stockinbingal	Mr. J. Neville, Stockinbingal.
St. John's Park	Mr. J. C. Scott, St. John's Park.
Tallawang	Mr. J. E. Hansall, Tallawang.
Taralga	Mr. Dave Mullaney, Stonequarry, Taralga.
Toronto	Mr. J. G. Desreaux, Esmond, Toronto.
Tumbarumba .. .	Mr. R. Livingstone, Tumbarumba.
Upper Belmore .. .	Mr. A. W. Fowler, Upper Belmore.
Uralla	Mr. E. A. Neil, Uralla
Wagga	Mr. Thos. Fraser, Aberfeldie, Wagga.
Walla Walla	Mr. H. Smith, Walla Walla.
Wallendbeen	Mr W. J. Cartwright, Wallendbeen.
Walli	Mr. A. V. Bloomfield, Walli.
Wetherill Park	Mr. L. Rainbow, Wetherill Park.
Wollun	Mr. C. E. Burke, Private Bag, Wollun.
Wolseley Park	Mr. H. McEachern, Wolseley Park.
Wyan	Mr. C. W. Harper, Myrtle Creek Railway Station.
Wyong	Mr. Edgar J. Johns, Wyong.
Yass	Mr. Cyril Ferris, Yass.

Notice to Honorary Secretaries.

It is important that a record of the meetings of the branches should be inserted in the *Agricultural Gazette*, and honorary secretaries are invited to forward to the Department a short account of the proceedings of each meeting, with a brief summary of any paper which may have been read, and the discussion that followed it, as early as possible after each meeting. Notes for insertion in the *Agricultural Gazette* must reach the Department before the 16th to ensure insertion in the following month's issue.

Insect Pests.—Quite a number of the branches have availed themselves of the Department's offer to supply a set of insects, being the common pests of the district, and the collections are now being cased. The Government Entomologist suggests that as each district has certain pests peculiar to its orchards and gardens, more useful work would be done if the members themselves collected the local pests (orchard, garden, and stock) and sent them to the Department, where they would be arranged, mounted, a descriptive label attached, and returned to the branch. Mr. Froggatt considers that such a collection would have a far greater value, as there would be more interest attached to the specimens when the members knew exactly where the pests came from, and where and how to find them.

Demonstrations in Clearing Land and Subsoiling with Explosives.

Demonstrations in clearing land and subsoiling with explosives will be given by Mr. H. C. Coggins, Assistant Inspector of Agriculture, to branches of the Agricultural Bureau. Branches who wish to take advantage of this offer are requested to make early application to the Department through their honorary secretaries.

Veterinary Lectures.

In connection with the lectures to branches of the Agricultural Bureau, it is herewith pointed out for the information of honorary secretaries that the following is the list of subjects of lectures which can be delivered to them:—

Horses.—(1) Conformation and Unsoundness (with lantern illustrations); (2) Colic and Treatment of Wounds; (3) Strangles, Influenza, and Tetanus.

Cattle.—(1) Tuberculosis (with lantern illustrations); (2) Contagious Abortion and Contagious Mammitis; (3) Ticks, Tick Fever, Tick Infestation and Eradication.

Sheep.—Parasitic Diseases of Sheep.

Pigs.—Diseases of Pigs.

General.—(1) Parturition of Farm Animals (with lantern illustrations); (2) Feeding of Farm Animals and Dietetic Diseases; (3) Sterility: Causes and Treatment in all classes of Stock.

Bee-keeping.

A series of lectures on bee-keeping is being arranged by Mr. R. G. Warry, Instructor in Apiculture. Secretaries, whose branches intend availing themselves of this opportunity to receive a practical insight into this branch of agriculture, are requested to make early application.

REPORTS AND NOTICES FROM BRANCHES.

Borambil.

The annual meeting of this branch was held on 9th January.

The Secretary reported that four ordinary meetings had been held. The branch had been favoured with lectures on wheat culture and bee keeping, and practical demonstrations in clearing and subsoiling with explosives, and in the handling of bees. All these were well attended.

The annual picnic and social in connection with the branch was held recently at the Borambil Recreation Reserve and Hall. During the afternoon over 100 persons were present at the picnic.

Canadian.

A lecture on "Farmers' Sheep" will be delivered before this branch by Mr. J. W. Mathews, Sheep and Wool Expert, early in March.

Cattai.

A branch has been formed at Cattai, Pitt Town, and the following have been elected office-bearers:—Chairman, Mr. E. G. Greentree; Vice-Chairman, Mr. J. Thompson; Treasurer, Mr. A. C. Marshall; Hon. Secretary, Mr. A. J. McDonald. The subscription was fixed at 2s. per annum.

Collie.

In submitting his annual report in January last, the Secretary of this branch stated that the membership totalled thirty-four. Eight meetings were held during the period under review, and were fairly well attended. Samples of grain and straw of various wheats, oats, and barleys were received from the Department of Agriculture. The Secretary urged members to increase their interest in the meetings, as he considered that much benefit could be derived from the interchange of views. All members should endeavour to get others to join.

Coradgery.

At the "after-harvest" meeting, held on 10th January, it was hoped that crop reports would be furnished by the majority of members, but the attendance was small, as many members were busy carting wheat, while others were enjoying a well-earned holiday at the seaside. Consequently, it was decided to adjourn the meeting until the end of the month. Several crop reports were read and discussed with interest, the most important being furnished by the chairman, Mr. W. E. Tayler.

The most important points brought to light by the season's work at Adavale were as follow:—

1. The overwhelming evidence in favour of winter bare fallow, together with thorough working.
2. The distinct gain in yield for the second year of such fallow, as against other land.
3. The urgent necessity of the drill following the last cultivation before any rain.
4. The risks run in sowing after May.
5. The advantage of sowing graded seed.
6. The necessity of leaving nothing to chance, of attention to all details, and of being thorough in everything.

The subject of a wheat competition amongst members was mentioned, and will be further discussed at the adjourned meeting.

Henty.

Mr. H. C. Coggins, Assistant Inspector of Agriculture, will conduct a demonstration of clearing and subsoiling with explosives in the early part of March at Henty.

Hillston.

The monthly meeting of the Hillston branch was held on 10th January, when Mr. A. J. Cashmere contributed the following paper:—

Most Suitable Wheats for Hay for the Hillston District.

In venturing to offer an opinion on this subject, I only intend to deal with wheats which I have grown personally. During the fifteen years that I have been growing wheat, I have grown the following varieties:—Purple Straw, Hudson's Early Purple Straw, Steinwedel, Allora Spring, Manitoba, Federation, Firbank, Yandilla King, Zealand, No. 5, Dart's Imperial, and Defiance.

But of all those varieties there are in my opinion five only that can be classed as first-class hay wheats, and to bring them down to this number, I will take first No. 5. This wheat is by far the best that I have grown. It grows tall, and the straw is clean and very heavy. I have repeatedly seen 90 lb. of chaff trampled into a bag, and stock are very fond of it.

Zealand.—This is a splendid hay wheat, and so closely resembles No. 5 that experts declare they are one and the same wheat. But my opinion is that there is a slight difference. However, it makes first-class hay and it is very heavy. It is late maturing.

Dart's Imperial.—This is a very good variety, and makes good hay if cut on the green side. Otherwise it is apt to show too much white for the percentage of green. This is also late maturing.

Defiance.—This wheat grows very tall, and it requires to be sown about 50 lb. to the acre. It makes very good hay; but it is on the bulky side, and it is very subject to smut.

Firbank.—This is a very early variety, and from the little that I have seen of it, I should say it would make good hay.

Discussion.—Mr. Hutchison asked if No. 5 was a good hay wheat for any season.

Mr. Cashmere thought it was, provided the land was properly worked. The seed was hard to procure since the drought of 1902. It was originally grown by a Riverina farmer who gave it the name. He would like to get some of the original seed to grow beside Zealand to see if there were any difference.

Mr. W. Cashmere said a lecture had been given some time ago by Mr. Sutton, who had spoken of No. 5. He (Mr. Cashmere) thought it a slow maturer, and not quite suited to this district. In his opinion Zealand was the best hay wheat for this district.

Mr. LAPTHORNE said he had proved Marshall's No. 3 to be a good general-purpose wheat in Victoria, and it had the merit of being practically rust-resisting.

Mr. RANKEN suggested that local farmers should experiment by sowing different wheats side by side under the same conditions, and compare the results.

Mr. J. HUTCHISON considered Steinwedel was a very good and safe wheat to sow, as it would give a return under almost any conditions.

Mr. W. Cashmere agreed to read a paper at the next meeting on the subject of "Flag Smut."

Inverell.

The annual meeting of this branch was held on the 16th January, when the Chairman stated that during the year eleven meetings had been held, and the attendance had shown a marked improvement.

During the year Mr. J. W. Mathews, Sheep and Wool Expert, had delivered two lectures before the branch, and Mr. A. H. E. McDonald, late Inspector of Agriculture, and Mr. S. J. Gilbert, M.R.C.V.S., had given one lecture each.

A feature of the meetings had been the papers contributed by members, which had stimulated much discussion and been profitable to those attending. In moving the adoption of the report Mr. Lewin paid a warm tribute to the work of the secretary.

At a further meeting, held on the 6th February, a paper was read by Mr. J. Leech.

MANURING.

Mr. LEECH said that in introducing the paper it was necessary to first look briefly into the composition of various soils. First, soils of all varieties are made up of two constituents known as organic and inorganic matter. Organic matter in soil is formed from the decay of animal and vegetable substances, and is frequently spoken of as "humus." Inorganic matter is formed by the decay of rocks. Pure sand is inorganic matter, and is entirely devoid of humus, and, as we all know, will not support the smallest plant life. Thus, to have a soil of any value, we must have both materials present in its composition. In a fertile soil the following substances will be found to exist:—Limestone (carbonate of lime), silica, aluminium, potash, soda, magnesium, oxide of iron, phosphoric acid and sulphuric acid. There are four of the foregoing ingredients that are more frequently found to be deficient in soils than the others. They are lime, potash, phosphoric acid, and nitrogen. The first three are inorganic or mineral substances, while nitrogen is organic. Of course, one will find many soils deficient in some of the other ingredients, but the four mentioned are the ones that interest a farmer the most. The shortage may be due to the following causes:—(1) The natural formation of the soil; (2) Washing out by water; (3) Continual cropping; (4) A small loss by direct evaporation.

The light red soil in this district is naturally devoid of lime, and an application of lime in some form or other would be found to be very beneficial. The high ground is very noticeably poorer than the flat. This is due to the water carrying down much of the soluble substances, chiefly nitrates, soda, and lime. Local observations shows us what continual cropping will do without the addition of manures. The amount lost by direct evaporation is so small that it need not worry us.

Manuring or fertilising is the science of supplying the deficiency of plant food to the soil. It is a science that is in its infancy yet, though our agricultural chemists and experts have made great strides of late, and have spared no pains to place their knowledge before the agriculturist. Soil may be manured, or rather fertilised, in two ways, viz., naturally and artificially. In all her works nature has some means of replacing the wastage. In soils we find there are several agents working to keep the soil fertile. 1. It is the nature of most soils to continue working towards the surface, and so, slowly but surely, the surface soil is being renewed. 2. Rain and snow are a great source of fertility

to the soil. 3. Soil is naturally enriched by the remains of plants, leaves from trees, &c. 4. Insect life and bacteria, whose function is the conversion of the unavailable nitrogen in vegetable matter into soluble nitrates.

But if soil is to be successfully cropped year after year the natural fertilising is not enough, and the soil inevitably grows poorer with each succeeding crop, and artificial fertilising becomes necessary. In artificial fertilising, animal excrement was probably the first method used, and farmyard manure, despite the trouble and cost of application, is still one of the surest and best all-round fertilisers known. Ashes and remains from various fires are another favourite manure. In my young days I remember farmers burning clay, pounding it up, and applying it to light soils. They did not know anything of the manurial value of the clay so treated, only that the crops were benefited. Lime is another of the old manures, and one of the best. The old method of applying burnt lime is probably the best. The line is carted to the paddock and put into small heaps—say, half a hundredweight in each heap—and covered with soil until properly slaked. It is then spread, and either ploughed or harrowed in. Gypsum and ground lime are both now extensively used because they are easier to apply, but they do not seem to be as beneficial to the soil as burnt lime. Seaweed, fish refuse, and slaughter-house refuse were all valuable manures, but guano, superphosphate, nitrate of soda, salt, sulphate of potash, Thomas' phosphate (or basic slag), and numbers of other manufactured or compounded manures have superseded the old toilsome fertilisers.

Now comes the question as to which fertiliser our particular soil or crop requires. Naturally, one would think that the easiest and surest way to arrive at the requirement would be to have the soil analysed and to apply the elements found deficient, but this does not always act. On this question I cannot do better than read an extract from an article in the *Agricultural Gazette*, by Mr. Guthrie:—"The idea that failure in plant production is due solely, or even chiefly, to deficient plant food in the soil is no longer tenable. Recent investigations have brought to light a host of other causes of unfertility, but the idea still persists that the determination of the amount of certain specified plant foods dissolved by specific solvents from the soil is a certain guide to the nature of the manuring required As a matter of fact, neither the chemical composition of the soil, nor of the crop, affords any certain basis on which advice as to manuring can be based." Further on Mr. Guthrie says: "Suppose a soil be well supplied with nitrogen and potash, but poor in phosphates, it by no means follows with any certainty that it will be benefited by phosphatic manuring."

As far as cereals are concerned, phosphatic manures have proved most beneficial. Farmers with poor pastures I would advise to experiment with basic slag (or Thomas' Phosphate), as I have seen remarkable results from its use. Bone meal and crushed bones form another very valuable manure for pasture land, and I am sure that by judicious manuring the carrying capacity of many farms could be doubled.

Many people seem prejudiced against fertilisers because they have given them one trial and the crop has not been much better But they must remember there are reasons why fertilisers fail to act the year they are applied—perhaps a shortage of water, or the condition of the soil, or the crop becomes smothered with weeds. But though not used by that particular crop, the manure is not lost; it is only lying in abeyance for the next crop, and perhaps several succeeding crops. Green manuring, or growing a crop to form manure for a succeeding crop, is another method of fertilising soils. All legumes have a peculiar function, that is, the power to secrete more nitrogen in the soil than they require for their own use, and thus enrich the soil for the following crop. When peas, beans, clovers, and suchlike plants are grown for green manure care must be taken to plough them in early enough to allow them to thoroughly decompose before the following crop is sown, or, instead of being beneficial, they may prove detrimental. The presence of decaying vegetable matter in the seed-bed causes bad germination, as the seeds themselves will rot. In conclusion, I must ask you to listen to a few figures which, to my mind, prove the benefit of manure in this district. Two farmers, whom we will call Mr. A. and Mr. B., have adjoining farms not 10 miles from Inverell. They both have paddocks which are sown with wheat. A.'s paddock has been cleared over twenty years,

and constantly cropped. B.'s paddock has been cleared three years, and has grown one wheat and one corn crop. The soil of both paddocks is similar, and the preparation of both paddocks was identical, viz., two ploughings, sowing, and harrowing. A. used 56 lb. of superphosphate per acre; B. did not manure. A. harvested 30 bushels per acre; B. 14 bushels. The cost of production to both would be about £1 3s. To A.'s expenses we add 3s. 6d. for manure. We therefore get A.'s return per acre, 30 bushels at 3s., £4 10s.; B.'s return per acre, 14 bushels at 3s., £2 2s.; A.'s net gain per acre, £3 3s. 6d.; B.'s net gain per acre, 19s. This gives A. a return of £2 14s. 6d. per acre more than B. for the same amount of labour. These figures are not manufactured for the occasion, as members of this branch know both paddocks well and also the yields.

We cannot follow the results of the various manure tests in the *Gazette* without seeing how advantageous the use of fertilisers is.

Kenthurst.

A paper was read by Mr. A. McGuffin at the meeting of this branch on 7th January.

Poultry in Conjunction with Fruit Growing.

Mr. McGuffin said: Up till a few years ago poultry-keeping for profit was neglected in our district, but now poultry-farms have sprung up on all sides, and are run in conjunction with fruit-growing. As a side-line to the principal industry of the district, it has many advantages, the use of blood and bone manures being quite unnecessary where poultry are run among the trees. In fact, lemon trees that were previously shy bearers have borne immense crops since they were supplied with poultry manure. I think that the soil and climate of this part of the Cumberland district is particularly adapted to the raising of poultry for market, and egg production has not yet overtaken the demand for new-laid eggs. The prices obtained during the past year show that fowls are a valuable asset on the orchard, returning a good profit on the food outlay, providing a fertiliser that is more beneficial than most artificial manures, and also helping in the eradication of pests that are common in every orchard. The breeds mostly kept are Leghorns and Black Orpingtons. The Leghorn is a very hardy bird, and will stand the cold snaps of winter just as well as the Orpington, while it is not so much affected by the heat of summer. I find fowls having a good range and run in flocks are far healthier, and the eggs hatch better than those from birds confined in small pens. I would advocate the orchard being netted in with 6-feet wire, instead of a lot of pens being put up. Providing proper attention is given to the feeding and watering of the birds, the result will be just as satisfactory as penning them, and will do away with most of the labour that is required in looking after the pens. Without an incubator a good stock of winter layers is hard to get, for broodies are generally scarce in the early spring months, so that for August and September-hatched chicks we must rely chiefly on the incubator. The pullets so hatched should be laying well in April and May, when the supply of eggs on the market is very small, and they will often not moult until the following autumn, but I think that the weather conditions have a good deal to do with pullets moulting. With regard to mating for breeding, I think that ten roosters run with a hundred hens will give far better results than hatching from penned fowls. I find that the best foods are wheat, cracked maize, and bran and pollard made into a mash in the morning in winter. In the hot weather the diet can be varied at times by boiling the wheat—a meal of which the hens are very fond. Some growers feed on millet and cheap seeds of various kinds, but my experience is that fowls require a good deal of educating to eat any strange foods. They easily lose their appetite if fed differently to what they have been used to, and loss of appetite in the hens means a greatly reduced egg yield. In the feeding of chickens, I find that wheat and cracked corn (cracked very small and mixed with shell grit) is about the best food, as it contains nothing that is liable to go sour very quickly. I think that most of the losses in chicks are caused by sour food and overcrowding in the brooder boxes.

At the February meeting of the above branch Mr. J. B. Jones read an interesting paper.

FARRIERY.

In dealing with this subject I shall, as far as possible, try to avoid the use of many technical terms, the meaning of which would entail much explanation. "No foot, no horse," is a proverb with farriers. A horse with a weak or diseased foot, no matter what his value, may be rendered useless for life if not properly shod. Therefore, shoeing is, or should be, a matter of serious consequence to the owner.

The foot in its natural state is adapted only to the grass surface of the ground, so that when it is brought into use upon hard and stony roads it becomes imperative to protect it by shoeing. The shoe should be as flat as possible, so that the horse should be able to put his foot down firmly. At times it is necessary to have heels, but for general use they are not to be recommended, except in extreme cases. Light shoes are preferable to heavy ones, for heavy shoes make a horse tired, and often cause brushing, speedy cutting under the knee, and other troubles. Horses that go faster than a walk should not be shod heavily; they should not be burdened with useless weight. The shoe should be made to fit the foot, not the foot to fit the shoe, as is frequently done. The foot of the horse varies very much, and it is seldom that two horses having identical feet are met with. That being so, it is always better for the horse to have his feet measured and the shoes made to fit than to use machine-made shoes, where every shoe is of the one pattern. Machine-made shoes have other defects as well, details of which it would be difficult to bring out in a paper of this kind. The use of steel in the toes is not to be recommended, although it is at times imperative to make the shoe last longer, but it has a slippery surface, especially when hardened.

The uses of bar-shoes are many. They may be used to take pressure off the heels where corns exist, or to protect diseased frogs. To take the weight of the horse off the frog, or to put the weight on to other parts, as the case may be, leather pads are sometimes used in conjunction with bar-shoes to relieve the jar occasioned by moving. The frog is also assisted and enabled to grow strong by these means, and weak heels may be relieved, and the usefulness of the horse much increased. In preparing the foot for the shoe, the less cutting and paring done the better. Shorten the toe, but do not lower the heels or cut the bars away—they are nature's support to the heels. Leave the frog intact, for that part was intended by nature to carry the weight of the horse. When the foot is diseased bar-shoes will be found effective.

Here another farriers' saying applies—"No frog, no foot" Leave those parts alone, for nature attends to them by frequent sheddings of the parts; and try to remember that the prolonged usefulness of the horse lies in the preservation of his feet. Finally, do not keep the shoes on too long. A month or five weeks is ample time to keep them on, and if not worn out then they should be removed and the feet attended to. The horse will then go more freely and be more sure-footed, to the satisfaction of man and beast alike.

Leech's Gully.

The usual monthly meeting of the above branch was to have been held on 12th January, but, owing to the inclemency of the weather, was postponed until the 19th, when there was a fair attendance.

Forms for crop reports were distributed to members to be filled in and returned to the Secretary for discussion at a subsequent meeting.

A sub-committee was formed to prepare a non-competitive exhibit from the farmers of Leech's Gully for the Tenterfield Show, to be held early in March.

Mr. A. MANSFIELD brought a sample of Hungarian Millet, and explained that it had been grown on rather poor soil with very little rain. For such conditions the sample was a very fair one.

Mr. P. Wilkie said that his experience of Hungarian Millet was that, if planted in November, it would make a splendid summer fodder, as it matured in six weeks; and if planted at once would be fit for use before winter set in.

Mr. F. Wigan, Dairy Instructor, gave a demonstration of milk-testing at Leech's Gully Public School on 29th January. The school was chosen because it was the most convenient centre, and also because it gave the teacher and pupils an opportunity of being present.

The branch has purchased a four-bottle Babcock tester, which is to be left at the school, and will be thus available for the teacher to give lessons to the pupils.

The attendance was not so good as might have been expected in a dairying district, but those who did attend (about twenty in number) were very pleased with the proceedings.

Testing Milk and Cream.

Before beginning the practical part of the demonstration, Mr. Wigan gave a very instructive lecture on dairying in general. He dealt with the quality of butter, urging suppliers to send in cream to the factory in a first-grade condition, in order to produce a first-grade butter. Milk-testing was profitable, as it gave the dairyman a chance of identifying the poor cows.

In giving the demonstration on testing, he took great pains to explain everything so thoroughly that even the school children said they could test milk themselves. Not only did Mr. Wigan give a demonstration of testing milk, but also of cream. Several samples of milk and cream were brought. The tests in milk ranged from 2·9 to 8·8, and the two samples of cream gave a test of 37 and 45 respectively. After Mr. Wigan's demonstration, the teacher of the school, Mr. J. Donnelly, tried his hand, and, with a little assistance from Mr. Wigan, did very well.

Leeton

A new branch has been established at Leeton, with thirty-one members, the annual subscription being fixed at 2s. 6d. The following gentlemen have been elected office-bearers:—Chairman, Mr. W. M. Nulty; Vice-Chairman, Mr. J. S. Oag; Treasurer, Mr. J. B Simpkins; Hon. Secretary, Mr. C. Ledwidge.

Little Plain.

This branch held its annual meeting on 27th November last, when the Chairman reported that the average attendance at the meetings during the past year had been 60 per cent. of the membership, which was regarded as satisfactory. Twelve meetings were held.

The ploughing match arranged by the branch in May last year was a huge success, the funds having benefited to the extent of £7.

The following paper was read by Mr. Frank S. Stening at the last meeting of the branch:—

The Importance of Type in Stock-breeding and Crop Farming.

Success in the production of stock or crops true to type, or improved type, may come sooner than anticipated, or may be delayed during many years of diligent labour, increased knowledge, experiment, perseverance, and frequent failure, but we must have the will to persist, and if we have that we shall be recompensed in a smaller or greater degree. In the first place, let us consider the meaning of the word "type" in the sense in which it is used as the subject of this paper. It may be defined as the distinguishing characteristic or characteristics of a breed when applied to stock, or of a variety or species when considering crops.

Should a farmer be a breeder of stock or a grower of crops, or combine both as a means of livelihood, he is faced with the axiom that if he does not progress he is sure to retrogress—there is no stationary position. Such a fact must therefore be viewed in all seriousness. He must decide what course he intends to try to pursue, and as there is only one satisfactory one it would be folly to even consider the other. To progress, the farmer has to strive to improve both the quality and produce of his stock or crops. This may, in a very great measure, be achieved by improving the type. To do this the farmer must aim at producing stock or crops better than their parents; it may not follow that he will always be successful in doing so, as there are so many conditions likely to affect the result.

The best way open to permanently improve the type of stock or crops is to breed on pure lines—that is, to prevent contamination by the introduction of a foreign strain. To evolve a new breed or variety, cross-breeding and cross-fertilisation has to be resorted to in many cases, and I know that some of our pure breeds have had foreign blood introduced at some time or other, in an endeavour to develop or to reintroduce a certain characteristic, but such introductions are generally fraught with danger, and harm is often done instead of good.

Were it not for the fact that there are many influences at work affecting type, the science of breeding would be an easy matter to control, but a close study of these influences will materially help the farmer in his endeavour to make an improvement. The laws of heredity, variation, and atavism are more or less conspicuous when breeding. The first, which may otherwise be defined as "like begets like," is no doubt the foremost law in the maintenance of type. The second law is indispensable for improvement, especially in regard to the breeding of stock, as it clearly demonstrates that the offspring varies, in more or less degree, in individuality as well as conformation, from that of the parents; and the third law may be explained as that of "throwing back," which is a condition that is sometimes met with in breeding and that often retards progress. Apart from these laws, there are other conditions that will affect type, such as judicious selection, environment (*e.g.*, climate, class of soil and country, etc.), treatment, and, with stock, the quality and quantity of food eaten. All these play an important part, and must be considered.

One has the benefit, by working on the lines aforementioned, of having something definite to aim at. Consequently he is likely to become more successful in his work. The farm work is conducted more systematically, and with keener observation and intelligence, and the farmer has the great pleasure of seeing the quality of his stock and crops improving, instead of going backward.

It is to be hoped that the disabilities many Australian farmers are labouring under may be speedily overcome, especially in sparsely populated districts, where the improvement of the type of stock and crops, especially the former, is attended with great difficulties and expense. There is also need of greater co-operation, and possibly of sacrifice, on the part of those concerned to carry out such work, so that all the branches of the farming industry may be placed on such a footing as to be able to successfully compete in the many markets of the world.

Martin's Creek.

A very interesting and instructive demonstration in summer pruning was given by Mr. J. G. R. Bryant, Assistant Fruit Expert, on 31st December, in the orchard of Mr. E. Burt. There was a very fair attendance of fruit-growers, some coming from Maitland; but the day was the hottest experienced here this summer, which accounted for a large number of other fruit-growers being absent.

The usual monthly meeting of this branch was held on Thursday evening, 8th January, when there was a good attendance of members.

An interesting discussion took place on the various insects to be found in the orchards of the district. The chairman, Mr. A. Vogell, described some of the useful insects with which he was familiar, and which he said were often destroyed as pests through people being ignorant of their usefulness. It was decided to apply to the Department for a set of insect pests.

Nimbin.

On the 15th December Mr. J. Wrenford Mathews, Sheep and Wool Expert, gave a lecture in the Nimbin Hall on the possibilities of sheep-raising. There were about forty present, and the lecture was illustrated with lantern views. Mr. F. J. Cullen occupied the chair.

Sheep-raising on the North Coast.

Mr. Mathews said that sheep-raising so far had never been a profitable undertaking on the Coast, but amongst a number there was now a very strong disposition to go into sheep and to give up dairying. The object of his mission was to put them on the right lines, or to warn them from engaging in an undertaking which might possibly result in failure. Reports had lately appeared regarding what had been achieved with sheep on the North Coast, but he advised all who thought of entering into the business not to place too much reliance upon results which had been obtained from an experiment covering only a comparatively short period. Personally, he had not seen sufficient to warrant him recommending anybody to make sheep-raising his sole occupation, although he had been well through the district and had seen many flocks. He did not wish to infer that sheep could not be kept under coastal conditions. In fact, he thought they could, as in some form or another they had adapted themselves to many kinds of climate: but what he was looking at was the financial success of the venture, and in this respect there was a great difference between having a few pets about the place and running sheep on a large scale. He could not recall a single instance where anybody for any length of time had been able to make a living out of sheep in those regions. There were possibilities, however, for they might be introduced as a side-line. It would, for example, be very nice for the farmer to enjoy the comforts of home-grown mutton, and those more favourably situated might profitably cater for local requirements. At the present time there were many on the Coast who never enjoyed the taste of mutton, and for those who could afford it, it had to be brought chiefly from Sydney. Whilst, therefore, he saw little prospect of sheep-farming becoming a separate industry, he thought that many farmers could profitably go in for a few sheep.

In taking it up, however, there were several difficulties that beset the beginner, and these would have to be surmounted. The one great drawback lay in the unsuitability of the climate to the great majority of breeds. He could not attach very much importance to the spasmodic effort which might enable an individual to run a large number of sheep on a small area for a year or so. The process of acclimatisation was slow, and, while to the ordinary individual certain signs of deterioration would perhaps go unnoticed, yet to the keen observer there were unmistakable signs of degeneration in the majority of sheep that he had seen in those parts. He instanced, in this connection, the Government flock at Grafton, for which he was largely responsible, stating that, although the sheep were doing much better there than when at Wollongbar, still the results so far had been anything but satisfactory. Certainly the trial had not been completed, but he did not think that he would have any reason to alter his opinion in the future. The Romney Marsh was the breed that they had under observation. At present he did not know of one better, but the time might come when it would be advisable to depart from the old tradition, and instead of looking to Great Britain for a suitable breed for their conditions, to seek it in some of the other countries. He had heard excellent accounts of Persian sheep, and he intended conferring with those in authority with the object of importing a number. All the breeds that we are now in possession of did well in almost every climate except a humid one. The Romney Marsh had proved itself to be eminently suited to wet conditions, but there was a considerable difference between a cold wet and a hot wet climate.

Possibly the strain could be preserved by constant reinvigoration from without, but a breed to suit the natural environment would undoubtedly be more in its place, and more likely to prove a permanent success. Apart from climate, they must further consider the nature of the soil, or, to be more exact, the kind of pasture produced by it. Paspalum, to the best of his belief, was not a suitable class of feed for sheep. It was too succulent and fattening. It might

serve the purpose very well so far as cows were concerned, and in the production of milk, but sheep required a more mixed diet. From his observations the sheep fattened rapidly on paspalum, but the flesh was not firm, only flabby. Moreover, when fed on it ewes rearing lambs failed to hold their condition. The finer and shorter grasses were the best for sheep, and he advised all who thought of grazing sheep to keep them on the higher and poorer lands where those kinds were usually more in evidence.

As regards buying and fattening, he did not hold out much encouragement. They were a long way from a central market, and the loss of time and expenses incurred in forwarding, to say nothing of the risks attending the business, would not warrant the undertaking.

He advised them to breed their own sheep, and taking care in laying down the foundation to obtain good sound stock, free from disease. The majority of the country would now be clean, but once they got diseases amongst their flocks they would find it more difficult perhaps than they anticipated to eradicate them. Sheep bred in a climate like theirs were most susceptible to a number of infections which were already common enough, and which were generally brought about by contamination from outside sources. If not properly looked after, however, they were liable to appear amongst flocks bred on the farm at any time. More or less, these troubles were all of an internal parasitic nature. Fluke was a very common malady amongst sheep in wet districts. It affected the liver, and was usually contracted from around swamps or where there was stagnant water. There were also several different forms of worms which invaded the stomach, lungs, and parts of the intestines.

To combat these diseases farmers were advised to provide a liberal supply of salt in the form of a lick, and also to fence off, drain, and distribute lime around stagnant pools. The salt should be given in covered troughs, and the sheep allowed free access to it. The lick recommended consisted of forty parts Liverpool salt, five parts calcium phosphate, and one part sulphate of iron. Farmers should also drench their sheep regularly. In most districts the best time to drench was during the autumn, but there again they must be guided by local conditions and the appearance of the sheep. If showing symptoms of debility, they should be immediately examined. Indications of fluke were usually shown by a yellowness about the inner part of the eye, on the tongue, around the gums, and more or less over the roof of the mouth. The presence of worms might be detected by pallidness of the skin and what would reflect a general anæmic condition of the blood. The following are the ingredients of the drench recommended by the Stock Branch of the Department and the methods of administration:—1 oz. arsenic, 2 oz. washing soda, ½ gallon rain water. The whole must boil for half an hour, and then water be added to make the liquid quantity up to 1½ gallons; give the mixture time to settle, pour off the liquid and bury the sediment. When drenching, the sheep should be firmly stood on its four legs, and the preparation allowed to trickle slowly down its throat. On no account should violence be used. The quantities given are as follow:—Young sheep, weaners, 1 fluid oz.; older sheep, up to 1½ fluid oz. A proper drenching horn, designed for the right quantities, should be secured for the purpose.

In order to more accurately test the suitability of the surroundings for sheep, Mr. Mathews advised all who contemplated the departure to have the whole thing placed on a thoroughly reliable and comparable basis. For a commencement a few acres should be set aside for sheep, leaving the balance for use as at present. If conducted on these lines, at the expiration of a few years they would be in a better position to judge whether the sheep would succeed, and whether they could obtain as good a return from them as from dairying. He recommended starting with, say, four sheep to the acre, and increasing the number if it was found the results warranted it. But he was emphatic in his views that the sheep should never be allowed to mix with the dairy herd, or *vice versâ*; otherwise the experiment would afford no reliable data as to the financial results. Perhaps pure Romney Marsh ewes might in many cases prove too expensive, but he strongly advised using only pure Romney rams. As a substitute for the pure-bred ewe, a grade Romney, which could be secured at a much lower figure, might serve almost as well. These, he thought, could be obtained from any of the recognised breeders of Romney Marsh sheep. In mating, while using only pure Romney rams, they should guard against

inbreeding and consequent degeneration. On no account should a ram be joined with his own progeny. Inbreeding was sometimes resorted to by experienced stock raisers, but not for flock purposes. Where mating reached that stage another ram should be procured. Their chief object was to secure an animal valuable for its mutton, and wool, therefore, was only a secondary consideration. They should aim at keeping up the size of the frame and improving the body, but they could not, under their conditions, very well expect to develop the wool, for they must consider the rainfall and the effect which it would be likely to have on a very heavily fleeced animal.

Orchard Hills.

A demonstration of clearing and subsoiling with explosives will be given by Mr. H. C. Coggins, Assistant Inspector of Agriculture, on 20th March.

Sackville.

A demonstration of clearing and subsoiling with explosives will be given by Mr. H. C. Coggins, Assistant Inspector of Agriculture, on 20th May next.

St. John's Park.

Mr. M. Blunno, Viticultural Expert, gave an interesting lecture and demonstration on Friday, 16th January, at Mr. Gava's vineyard. Several vines were dug out to ascertain the cause of bacterial growth, and the discoveries in each case were clearly explained.

The lecturer advised studying the soil when planting, and selecting stocks suitable. He recommended for the district, Mourvedre on Rupestris No. 1,202 and Aramon on Rupestris Ganzin No. 1, which are quick and strong growers. Chasselas on Berlandieri 41 B and Berlandieri on Riparia 157 B were slow growers and bad strikers, but splendid reliable stocks and strong growers, and would stand hard ground and dry weather. Mr. Hunt's vineyard was also visited.

Mr. W. W. Froggatt, Government Entomologist, gave members of this branch, on Wednesday, 11th February, a lantern lecture on useful and injurious insects. There was a fair attendance.

Wollun.

The usual monthly meeting of this branch was held on Saturday, 24th January, when there was a large attendance of members.

The Secretary reported that while in Sydney he had interviewed the Government Entomologist, Mr. Froggatt, regarding the sheep fly parasite, and it was unanimously decided to make arrangements for a supply of the chalcid wasps to be obtained from the Department for local distribution.

The chairman (Mr. T. C. Burnell), who is a keen student of entomology, gave the meeting some interesting facts regarding insect parasites and chalcid wasps, conclusively proving that the wholesale breeding of this parasite would not, as many thought, introduce a new pest.

The locust plague, which has been fairly rampant in the district, was brought under discussion, and an interesting debate on the Bulletin issued by the Department of Agriculture on "Locusts in Australia and other Countries" took place. A few very remarkable facts regarding their methods of breeding and the treatment adopted in various countries for their prevention and destruction were revealed. It was unanimously decided, "That, in the interests of the State, a more uniform method of treatment of the pest by landholders and the Crown was absolutely necessary, and that the initiative in this movement should be taken by the Department of Agriculture."

Orchard Notes.

W. J. ALLEN.

MARCH.

Cultivation.

WHEREVER the weeds have been allowed to grow unchecked, they should be turned under some time this month, and if crops for green manure—such as grey field peas, tares, rape or rye—are to be sown among the trees, they should be put in as early as possible. If, however, no crop is to be sown, it would be well to allow the land to remain in the rough state after ploughing. It will gradually mellow down and remain in good condition until it is time to plough again next spring.

Provision should be made for furrows to carry away storm waters and prevent washing of the soil. In citrus orchards particularly, open furrows should be left to carry off any surplus waters, on account of the assistance given in draining the land.

Citrus trees at this season of the year should be kept free from excessive moisture about the roots. The lack of drainage in many of our citrus orchards seems the underlying cause of many fungous and other troubles.

Grading and Packing Fruit.

The chief points in grading apples are :—Size, colour, freedom from disease, and uniformity through every case.

The export market generally demands a good, clean, medium-sized fruit, $2\frac{1}{2}$ inches being about the ideal, as the buyer generally wants what to the trade is known as a good count. Extra large fruit is not desirable, as these are generally coarse, and do not keep so well. As a general rule, three sizes are shipped ($2\frac{1}{2}$, $2\frac{3}{4}$, and 3 inches); with varieties such as Jonathan, that have good colour and do not run large, $2\frac{1}{4}$ will pay to ship. When grading, any fruit which shows the slightest sign of disease should certainly be thrown out.

It is impossible to overestimate the importance of grading apples for market. It is a thing which cannot be overdone. Most fruit is practically unsaleable without grading, and the better the grading the better it sells.

At our Bathurst Government orchard, when packing apples the following grades are adopted :—

Extra Choice—3 inches.

Extra fine specimens only, uniform in size, colour, and form, and without blemish.

Choice 1st—$2\frac{3}{4}$ inches.

Good fruit, not so fine as Extra Choice, uniform in size, colour, and form, and practically free from insect, injury, or defect.

Specially selected 2nd—$2\frac{1}{2}$ inches.

Mostly good eatable fruit, uniform, and not conspicuously marked by insect, fungus, or other damage.

Selected 3rd—$2\frac{1}{4}$ inches.

Third grade, uniform, sound, and free from conspicuous injury.

Every grower's pack should be as good as his bond; no topping up, nor filling up corners with small apples. Buyers want honestly packed goods, and they are usually willing to pay good prices for such. Each case should be filled with the same grade throughout; a few seconds or culls scattered in with a lot of prime fruit give the buyer an opportunity to discriminate against the whole package, and ruin the reputation of the grower.

Apples must be cool and dry before being packed. Heat and moisture promote decay. Each case should be well filled, with the contents placed firmly and snugly. Every day consignments are placed on the market showing evidence of careless packing. If growers would consider for one moment the average route travelled by a case of apples for market they might be a little more particular. The case is taken from the packing shed and put on the cart: it is then hauled, perhaps, for some miles over the average country road to the railway station. After bumping along in the train for some miles, it is again unloaded and placed in a lorry and hauled for several squares over the city streets to the boat, where it is unloaded again ready for shipment to its destination, when, after some more knocking about, it is opened for the inspection of the foreign buyer, and to compete against the fruit of the world. Unless the case has been well filled and packed before starting, it will reach the market in what is commonly known as "slack" condition. The numerous jarrings received *en route* will have caused the contents to settle and shrink, with the result that the case will only be partially full. When placing the fruit in the cases it is found that the diagonal (numerical) system of packing is the most suitable. The packing under this system is known as the 2-1, 2-2, or 3-2 packs. In some cases the conical varieties of apple should be placed on their sides (cheeks) when putting them in the rows. In this way they fit more snugly and give less loss of space and, therefore, fill the case better.

Buyers will not pay the price of full packages for those received only filled in part. Not only is the sale affected in this way, but loose packing invariably causes bruises and the general defacement of each specimen. Too tight packing must also be guarded against, as this generally results in bruising. There is a happy medium in packing that can only be learned by practical experience.

Wrapping.

Whether the apples should be wrapped or not depends somewhat on the variety and the grade of fruit. Wrapping has several advantages:—

1. It serves as a cushion in the case of delicate fruit.

2. It prevents rot and fungoid diseases from spreading from one fruit to another.
3. It maintains a more even temperature in the fruit.
4. The fruit has a somewhat more finished appearance when exposed for sale.
5. Wrappers keep the fruit firm and snug in the packages.

Disadvantages of wrapping :—

1. It adds to the cost of packing.
2. It prevents rapid cooling in cases where the fruit is not cool at the time of packing.

Strawberries.

The land should be in a good state of tilth, having been thoroughly worked to receive the young plants. If the intending planter has not raised the plants himself he should procure them from a successful grower, and see that the parent plants are strong, fruitful, and free from diseases. Distance of setting depends upon the character of the soil, freedom with which the variety selected sends out runners, &c. In good soils the rows should be from 3 to 4 feet apart, and the plants 18 inches apart in the row. Compactly growing varieties may be planted a little closer. This is called "hill" culture, and consists of growing each plant by itself in a hill, not allowing the runners to grow: consequently each plant becomes stalwart and large, and when properly attended to produces the very finest fruits.

Matted Rows.—This system is generally adopted by large growers, as it requires less labour to attend to a large area. By the matted row system more berries are produced on an acre than by the hill culture, but the latter method gives larger and finer berries. The rows are set from 3 to 4 feet apart, and the plants about 15 inches apart in the row. When the runners start they may be so arranged that they form a continuous matted row. The grower can suit himself as to how wide he allows the row to run. Some allow the rows to become 2 feet wide, and others only 1, according to the distance apart the rows have been set. The runners can be kept in check after the row has attained the desired width by using a roller cutter, running up and down between the rows, or by the use of the spade or hoe.

Before setting out the new plant, all dead leaves and runners should be removed, and the roots shortened by at least one-third of their length.

The following are the number of plants to the acre, at the distances mentioned :—

2 ft. x 1 ft. ...	= 21,780	3 ft. x 1 ft. ...	= 14,520
2 ft. x 1 ft. 6 in.	= 14,520	3 ft. x 1 ft. 6 in.	= 9,680
2 ft. x 2 ft. ...	= 10,890	4 ft. x 1 ft. ...	= 10,890
2 ft. x 1 ft. 6 in.	= 14,520	4 ft. x 1 ft. 6 in.	= 7,260

The following list comprises those varieties which at the present time are mostly grown for the best paying results :—Aurie, Annetta, Royal Sovereign, Captain, Trollope's Victoria, Edith, Marguerite, Sir Joseph Paxton, King Edward VII, Dr. Moree, Noble, Sunbeam, and Melba.

Fruit Fly and Codlin Moth.

It seems almost incredible that any fruit-grower who is alive to his own interests would allow fly or moth-infested fruit to lie on the ground until the grubs have left them, but such is the case, and it is to these careless growers that we are usually indebted for the breeding and spreading of many of our pests. It is also these growers who give so much extra trouble to our Inspectors under the Fruit Pests Act, in seeing that no neglect takes place.

Small flat tins or saucers suspended on the sunny side of the tree, and containing a small quantity of kerosene, serve as a splendid trap for the adult fruit flies on the wing. By adopting this practice growers are placing themselves in the position of minimising the source of infection. To secure the best results by this method every citrus grower should set traps as suggested.

Budding.

It is rather late, but if the month should prove a warm one, it is quite possible that buds will still take if inserted in deciduous trees which are not producing either good fruits or satisfactory crops. Nursery stock may still be budded.

Preparing Land for Planting.

Clearing, grubbing, ploughing, and subsoiling, preparatory to planting, should now be carried out as soon as possible, and those who intend planting this coming winter, and who have not completed these operations, should lose no time in finishing this work, so that new land will have a little time to sweeten before the young trees are set out, as well as to enable the orchardist to complete all planting operations early in the winter.

Foal with Laminitis.

A correspondent recently found that a three weeks old filly foal became very distressed in the heat, panting very much, and when put into the shade threw itself down, partially recovering in about an hour. The following morning it walked very stiffly, and though fat and growing well, lay down most of the time. The hoofs, however, looked as if they were coming off, though the feet were not sore, the animal allowing them to be rubbed without flinching.

In reply, the Veterinary Officers of the Stock Branch stated that the foal was apparently affected with laminitis or fever in the feet. The feet should be bathed or the foal stood in cold water once or twice daily. The feet should then be dried and the following lotion applied :—

Lead acetate	6 drams.
Zinc sulphate	6 drams.
Water...	30 ounces.

It is quite possible that this animal will shed its hoofs but, if it does, new hoofs will form.

Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull.	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn	Imperialist	Florio	Lady Nancy of Minembah.	Berry Farm	*
Jersey	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Cowra Farm	*
"	Thessalian II.	Thessalian (imp.).	Egyptian Princess (imp.).	Wagga Farm	*
"	Xmas Fox (imp.)	Silver Fox	Malvoisie	Wagga Farm	*
"	Trafalgar	Best Man	Rum Omelette	Wagga Farm	*
"	Kaid of Khartoum	Sir Jack	Egyptian Belle	H. A. College	*
"	Bridegroom	Best Man	Golden Omelette	Yanco Farm	*
Guernsey	The King's Mirror	Calm Prince	Vivid (imp.)	Kyogle	4 July, '14.
"	Star Prince	Calm Prince	Vivid (imp.)	Casino	-- Sept., '14.
"	Sky Pilot	Prince Souvia	Parson's Red Rose (imp.).	Maclean	11 July, '14.
"	Prince Souvia	Vivid's Prince	Souvenir (imp.)	Wollongbar Farm	*
"	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (6509)	Inverell	5 April, '14.
"	Sunshine	King of the Roses	Princess Vivid	Grafton Farm	†
"	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	*
"	Claudius (imp.)	Golden Star II.	Claudia's Pride (imp.).	Tweed River	18 Aug., '14
"	Trengwainton Village Favourite (imp.)	Trengwainton Village Lad.	Wild Eyes	Wollongbar Farm	*
"	George III	King of the Roses	Calm 2nd	Berry Farm	†
"	The Peacemaker	Calm Prince	Rose Petersen	Scone	2 July, '14
"	King of the Roses	Hayes' King	Rosey 8th (im.)	Bega	20 June, '14.
"	Lauderlad	Laura's Boy	Souvenir of Wollongbar	Casino	-- Sept, '14.
"	Belfast	King of the Roses	Flaxy 2nd	South Grafton	— Mar., '14.
"	Royal Preel	Itchen Royal	Hayes' Lily du Preel (imp.).	Murwillumbah	31 May, '14.
"	Prince of Warren Wood (imp.).	Kingsmoor Governor (1952)	Quail (7051)	Berry Farm	*
"	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Fredericton	— Sept., '14.
"	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	H.A. College, Richmond	†
Ayrshire	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose	Grafton Farm	*
"	Orphan Boy	Songster of Greystanes.	Rosamond	Glen Innes Farm	*
"	Wyllieland Bright Lad (imp.)	Wyllieland Gleniffer (7229)	Wyllieland Sangie	H.A. College, Richmond	*
Kerry	Rising Sun	Bratha's Boy	Dawn	Bathurst Farm	*

*Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed.

Department of Agriculture,
Sydney, 2nd March, 1914.

BULLS FOR SALE

AT AUCTION.

Sydney Royal Show, Easter, 1914.

THE following bulls will be submitted to auction at the Royal Agricultural Show, Easter, 1914, unless sold previously by private treaty:—

GUERNSEYS.—**Village Beau** (554): date of birth, 12th June, 1912; colour, lemon and white; sire, Trengwainton Village Favourite (imp.), 2,102; dam, Vivid's Pet by Peter (imp.); g d, Rose Vivid by Rose Prince (imp.); dam of sire, Wild Eyes, 7,931, E.G.H.B., by Trengwainton Hero, 1,727. Reserve price, **£25.**

Milk yields of dams:—

	Milk lb.	Fat per cent.	Butter lb.
Vivid's Pet	6,343	4·6	343
Rose Vivid	6,617	5·2	406

Duke of Connaught (581): date of birth, 12th October, 1912; colour, lemon and white; sire, Calm Prince by Rose Prince (imp.); dam, Bel Air 6th (imp.) by Sequel's Crescendo, 1,406; g d, Bel Air 4th, 5,800, by Financier 3rd, 1,277; dam of sire, Gentle (imp.) by Masher, 934, from Calm (imp.). Reserve price, **£35.**

Milk yield of dam:—

	Milk lb.	Fat per cent.	Butter lb.
Bel Air 6th (imp.)	6,818	5·2	411

Four-Leaf Shamrock (584): date of birth, 26th November, 1912; colour, lemon and white; sire, Calm Prince by Rose Prince (imp.); dam, Shamrock of Les Vesquesses 6th (imp.), 6,829, by Jap, 1,513; g d, Shamrock of Les Vesquesses, 5,394, by Royal Blood 5th, 1,111; dam of sire, Gentle (imp.) by Masher, 934, from Calm (imp.). Reserve price, **£30.**

Milk yield of dam:—

	Milk lb.	Fat per cent.	Butter lb.
Shamrock of Les Vesquesses ...	4,941	4·9	285

King of the Preel (592): date of birth, 31st December, 1912; colour, lemon and white; sire, Trengwainton Village Favourite (imp.), 2,102; dam, Flower of the Preel 3rd (imp.), 8,319, by Squire of Les Sages 2nd, 1,318; g d, Flower of the Preel (2,099, P.S.R.G.A.S.); dam of sire, Wild Eyes, 7,931, by Trengwainton Hero, 1,727. Reserve price, **£30.**

Milk yield of dam:—

	Milk lb.	Fat per cent.	Butter lb.
Flower of the Preel 3rd (imp.) ..	6,137	4·6	332

Peaceful Bijou (585): date of birth, 6th December, 1912; colour, lemon and white; sire, The Peacemaker by Calm Prince; dam, Bijou de la Fontaine 3rd (imp.), 5,382, by Cholderton Lord Roberts, 1,272; g d, Bijou de la Fontaine, 3,976, by Fontainebleau; dam of sire, Rose Petersen by Peter (imp.). Reserve price, **£30.**

Milk yields of dams:—

	Milk lb.	Fat per cent.	Butter lb.
Rose Petersen	5,272	4·6	283
Bijou de la Fontaine 3rd	4,178	. .	225

Rose Prince II. (490): date of birth, 23rd June, 1911; colour, lemon and white; sire, Calm Prince by Rose Prince (imp.); dam, Rosey 8th (imp.), 6,695, by Broomflower 2nd, 1,641; g d, Rosey 3rd, 3,912, by Waldo, 847; dam of sire, Gentle (imp.) by Masher, 934, from Calm (imp.). Reserve price, **100 guineas.**

Milk yield of dam:—

	Milk lb.	Fat per cent.	Butter lb.
Rosey 8th (imp.)	7,732	4·5	409

JERSEYS.—Full Cry (546): date of birth, 16th April, 1912; colour, whole fawn; sire, Xmas Fox (imp.); dam, Calceolus by Tidy Punch; g d, Calceolaria (imp.) by Woolloomooloo, 5,447; dam of sire, Malvoisie (vol. xx, p. 369) by Gay Boy, 7,510. Reserve price, **£20.**

Milk yield of dam :—

	Milk lb.	Fat per cent.	Butter lb.
Calceolus	6,113	5·5	397

Golden Fox (586): date of birth, 7th December, 1912; colour, whole fawn; sire, Xmas Fox (imp.); dam, Golden Omelette by Sir Jack; g d, Rum Omelette 2nd by Golden Lord; dam of sire, Malvoisie (vol. xx, p. 369) by Gay Boy, 7,510. Reserve price **£20.**

Milk yields of dams :—

	Milk lb.	Fat per cent.	Butter lb.
Golden Omelette	3,064	5·6	202 (in 28 weeks)
Rum Omelette 2nd	5,667	4·4	361

Irish Fox (565): date of birth, 26th July, 1912; colour, whole fawn; sire, Xmas Fox (imp.); dam, Pattibelle, 192, by Lily's Boy (vol. ix, p. 86); g d, Claribelle 38 (imp.) by Oxford Duke, 5,314; dam of sire, Malvoisie (vol. xx, p. 369) by Gay Boy, 7,510. Reserve price, **£15.**

Claribelle (imp.) was champion Jersey female at the Royal Melbourne Show, and Pattibelle as a yearling obtained first in her class and reserve champion to her mother.

Royal Blood (473): date of birth, 26th February, 1911; colour, whole fawn; sire, Berry Melbourne by Melbourne (imp.); dam, Calceolus by Tidy Punch; g d, Calceolaria (imp.) by Woolloomooloo, 5,447; dam of sire, Rum Omelette (imp). by Athol Brose, 4,472. Reserve price, **£30.**

Milk yield of dam :—

	Milk lb.	Fat per cent.	Butter lb.
Calceolus	6,113	5·5	397

SHORTHORNS.—Lloyd George (561): date of birth, 5th July, 1912; colour, red and white; sire, Imperialist; dam, Dora by Pansy King; g d, Dora Sandgrave by Lord Sandgrave; dam of sire, Lady Nancy of Minembah, 357. Reserve price, **£15.**

Milk yield of dam :—

	Milk lb.	Fat per cent.	Butter lb.
Dora	7,868	3·7	342

HOLSTEINS.—Bobbie Obbs (575): date of birth, 24th August, 1912; colour, black and white; sire, Froxfield Chevin Bob (imp.); dam, Maggie Obbe by Obbe (imp.), 2,395; g d, Margaretha (imp.), 10,439; dam of sire, Froxfield Alice, 358. Reserve price, **£20.**

Milk yields of dams :—

	Milk lb.	Fat per cent.	Butter lb.
Maggie Obbe	7,699	..	272
Margaretha (imp.)	10,990	...	407

Colonel Neitenstein (355): date of birth, 26th April, 1912; colour, black and white; sire, Neitenstein by Hollander; dam, Marjorie, by Chairman; g d, Margaretha (imp.), 10,439; dam of sire, Dutch Oven by President. Reserve price, **£15.**

Milk yields of dams :—

	Milk lb.	Fat per cent.	Butter lb.
Marjorie	5,030	...	224
Margaretha (imp.)	10,990	. .	407
Dutch Oven	8,671	3·6	365

Field Marshal (318): date of birth, 12th October, 1911; colour, black and white; sire, De Wet by Hollander; dam, Lolkje Field by Garfield (imp.), 2,389; g d, Lolkje by Joubert; dam of sire, La Shell by The Hague. Reserve price, **£15.**

Milk yields of dams :—

	Milk lb.	Fat per cent.	Butter lb.
Lolkje Field	4,305	...	173
Lolkje	5,828	3·5	234

AYRSHIRE.—Jamie's Heir (203): date of birth, 25th July, 1905; colour, white and brown; sire, Jamie of Oakbank; dam, Miss Prim by Mischief Maker, of Barcheskie (imp.), 3,892; g d, Primrose of Barcheskie (imp.) by Royal Stuart of Glenbuck, 2,678. Reserve price, **85 guineas.**

Milk yield of dam :—

	Milk lb.	Fat per cent.	Butter lb.
Miss Prim	5,834	...	240

AYRSHIRE.—The Corsair (483): date of birth, 6th May, 1911; colour, red and white; sire, Byron by Auchenbrain Spicy Jock (imp.); dam, Ripple Rose by Prince Emerald (imp.); g d, Rose Berry by Mischief Maker of Barcheskie (imp.), 3,892; dam of sire, Julia by Peacemaker. Reserve price, **15 guineas.**

Milk yields of dams:—

	Milk lb.	Fat per cent.	Butter lb.
Ripple Rose	7,669	3·9	351
Rose Berry	5,799	4 1	280

KERRY.—Kildare II (210): date of birth, 25th August, 1905; colour, black; sire, Kildare (imp.); dam, Belvedere Bratha 3rd (imp.), 2,219, by Belvedere Black Prince, 351; g d, Bratha II, 1,617, by Ciarrague, 127; dam of sire, Kitty, 1,092, by Paddy Blake, 237. Reserve price, **£18.**

Milk yield of dam:—

	Milk lb.	Fat per cent.	Butter lb.
Belvedere Bratha 3rd	8,310	4·5	442

AT GLEN INNES EXPERIMENT FARM.

AYRSHIRES.—The Poet: calved 17th February, 1912. Sire, Byron; dam, Scotch Heather, by Jamie's Ayr; g d, Leaf Bud, by Prince Emerald (imp.); g g d, Rose Berry, by Mischief Maker of Barcheskie (imp.), 3,892. Price, **£10.**

Byron's Boy: calved 3rd March, 1912. Sire, Byron; dam, Hattie Craig, by Daniel of Auchenbrain (imp.); g d, Juliette, by Mischief Maker of Barcheskie (imp.), 3,892; g g d, Judy IX of Barcheskie (imp.), 11,882, by Traveller of Drumjoan, 1,441. Price, **£10.**

Bright Boy: calved 8th November, 1912. Sire, Wyllieland Bright Lad (imp.); dam, Moonstone, by Emerald's Mischief; g d, pure Ayrshire Cow, No. 163, Hawkesbury Agricultural College Register. Price, **£5 5s.**

AT WOLLONGBAR EXPERIMENT FARM.

GUERNSEYS.—Bull calf from Sweetheart by Hayes' Fido (imp.); calved 8th March, 1913. Price, **£40.**

Bull calf from Golden May of the Grone by Hayes' Fido (imp.); calved 4th February, 1913. Price, **£30.**

Bull calf from Dido by Beaucaire's Baby; calved 27th July, 1913. Price, **£30.**

GEORGE VALDER, Acting Under Secretary, and
Director of Agriculture.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1914.

Society.	Secretary.	Date.
Uralla A. Association	**H. W. Vincent ...**	**Mar. 3, 4, 5**
Tenterfield P., A., and M. Society	**F. W. Hoskin ...**	**„ 3, 4, 5**
Tumut A. and P. Association	**T. E. Wilkinson...**	**„ 4, 5**
Braidwood P., A., and H. Association	**L. Chapman ...**	**„ 4, 5**
Bega A., P., and H. Society	**W. A. Zingel ...**	**„ 4, 5**
Port Macquarie & Hastings Dist. A. and H. Society...	**T. Dick ...**	**„ 5, 6**
Oberon A., H., and P. Association	**M. J. Looby ...**	**„ 5, 6**
Nepean District A., H., and I. Society (Penrith) ...	**P. J. Smith ...**	**„ 6, 7**
Central New England P. & A. Association (Glen Innes)	**George A. Priest...**	**„ 10, 11, 12**

1914.

Society.	Secretary.	Date.
Molong P. and A. Association	W. J. Windred	Mar. 11
Coramba District P., A., and H. Society	H. E. Hindmarsh	,, 11, 12
Bombala Exhibition Society	W. G. Tweedie	,, 11, 12
Campbelltown A. Society	F. Sheather	,, 11, 12
Gulgong A. and P. Association	D. H. Spring	,, 11, 12
Tumbarumba and Upper Murray P. and A. Society	E. W. Figures	,, 11, 12, 13
Wauchope P., A., and H. Society	A. D. Suters	,, 12, 13
Blue Mountains A., H., and I. Association	Chas. Wooller	,, 13, 14
Gundagai P. and A. Society	A. Elworthy	,, 17, 18
Bangalow A. and I. Society	W. H. Reading	,, 17, 18, 19
Armidale and New England P., A., and H. Assoc'n.	A. McArthur	,, 17, 18, 19, 20
Cumnock P., A., and H. Association	K. J. Abernethy	,, 18
Cobargo A., P., and H. Society	T. Kennelly	,, 18, 19
Camden A., H., and I. Society	C. A. Thompson	,, 18, 19, 20
Goulburn A., P., and H. Society	G. G. Harris	,, 19, 20, 21
Mudgee A., P., H., and I. Association	P. J. Griffin	,, 24, 25, 26
Narrabri P., A., and H. Society	D. J. Bridge	,, 24, 25, 26
Blayney A. and P. Association	H. R. Woolley	,, 25, 26
Macleay A., H., and I. Association	E. Weeks	,, 25, 26, 27
Crookwell A., H., and P. Society	J. H. Huxley	,, 26, 27
Luddenham A. and H. Society	F. C. Emery	,, 31, Apr. 1
Cooma P. and H. Association	C. J. Walmsley	April 1, 2
Coonabarabran P. and A. Association	G. B. McEwen	,, 1, 2
Upper Hunter P. and A. Association, Muswellbrook	R. C. Sawkins	,, 1, 2, 3
Taralga A., P., and H. Association	G. Goodhew	,, 2, 3
Royal Agricultural Society (Sydney)	H. M. Somer	,, 7-15
Adaminaby P. and A. Association	W. Delany	,, 15, 16
Batlow A. Society	C. S. Gregory	,, 21, 22
Kyogle P., A., and H. Society	R. J. Nithery	,, 22, 23
Bathurst A., H., and P. Association	J. Bain	,, 22, 23, 24
Hunter River A. and H. Association (West Maitland)	E. H. Fountain	,, 22, 23, 24, 25
Tamworth P. and A. Association	J. R. Wood	,, 28, 29, 30
Richmond River A., H., and P. Society (Casino)	D. S. Rayner	,, 29, 30
Warren P. and A. Association	A. C. Tompson	,, 29, 30
Orange A. and P. Association	W. J. I Nancarrow	,, 29, 30 May 1
Northern Agricultural Association (Singleton)	J. McLachlan	,, 29, 30, May 1
Clarence P. and A. Society (Grafton)	G. N. Small	May 6, 7, 8
Hawkesbury District A. Association (Windsor)	H. S. Johnston	,, 7, 8, 9
Lower Clarence A. Society (Maclean)	J. McPherson	,, 12, 13
Warialda P. and A. Association	C. J. Devine	,, 12, 13, 14
Coonamble P. and A. Association	J. C. Wilson	,, 13, 14
Gloucester A., H., and P. Association	G. E. Furness	,, 20, 21
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Narandera P. and A. Association	W. T. Lynch	Aug. 4, 5
Corowa P., A., and H. Society	John D. Fraser	,, 18, 19
Murrumbidgee P. and A. Association (Wagga Wagga)	A. F. D. White	,, 25, 26, 27
Gunnedah P., A., and H. Association	M. C. Tweedie	Sept. 1, 2, 3
Albury and Border P., A., and H. Society	W. I. Johnson	,, 8, 9, 10
Cootamundra A., P., H., and I. Association	T. Williams	,, 15, 16
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Murrumburrah P., A., and I. Association	J. A. Foley	,, 22, 23
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Yass P. and A. Association	W. Thomson	,, 30, Oct. 1
Hay P. and A. Association	G. S. Camden	Oct. 6, 7
Tweed River Agricultural Society	A. E. Budd	Nov. 11, 12

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Agricultural Gazette of New South Wales.

The Pastures of the Coast.

E. BREAKWELL, B.A., B.Sc., Agrostologist.

Introduction.

In the coastal districts of New South Wales it is the rule, rather than the exception, to find cleared and settled areas laid down with introduced grasses.

The early settlers, accustomed to the cultivated grasses of Great Britain, such as cocksfoot and rye grass, did not delay in trying these on their virgin lands. In the many coastal localities adapted to the conditions necessary for the successful cultivation of the English grasses, the latter have proved a valuable acquisition to the pastures. The stock owners, who at first rely on the native grasses, soon discover that, with the exception of couch, the more nutritious native grasses are quickly eaten out, and that the carrying capacity may be considerably increased by laying down to cultivated pastures.

In districts such as the North Coast, however, until the advent of paspalum, either native pastures or buffalo grass had to be relied upon, the extremely hot conditions in summer proving too much for the English grasses. The introduction of paspalum and Rhodes grass has marked a new era in the dairying industry of the State. Farmers were not long in discovering that for newly cleared scrub land paspalum and Rhodes grass were pre-eminently adapted. Thousands of acres have been utilised, and many thousands more can still be utilised in this way.

Native grasses will, of course, always have a place in the coastal districts. In localities where cultivation is impracticable, or where the soil is particularly unsuitable, the farmer by judicious stocking can maintain a good stand of native pastures; but where two blades of grass can be made to grow where only one grew before by means of seeding to introduced grasses, it is to the interest of the land-owner to experiment until he has found the best, and thus eventually increase the carrying capacity of his holding.

There is still plenty of scope on the coast, not only for trials with the less known grasses, but also for the improvement of pastures laid down to those more commonly grown. It is a frequent occurrence to find neglected cocksfoot and rye pastures, the better grasses smothered out with Parramatta grass (*Sporobolus indicus*), or with lamb's tongue (*Plantago lanceolata*). Indeed, many dairymen expect a pasture, once laid down, to last at least for a score of years, and many pastures of this age can be found. That a pasture, without any manurial treatment or re-cultivation, can retain its carrying capacity for this length of time, is against all natural reasoning. Grasses, like any other fodder plant, produce results in proportion to the treatment they receive.

The principal grasses cultivated on the coast are dealt with in the following paragraphs.

Paspalum dilatatum on the North Coast.

This grass reaches its maximum development on the Richmond River; it is also grown to a large extent on the Tweed, Clarence, Hastings, Macleay and Manning Rivers, and to a small extent on the Hunter and on the South Coast.

The climatic conditions and soil formation of the Richmond River country are eminently adapted to the best development of paspalum. There we have a rich, loose, basaltic or alluvial soil formation, a sub-tropical temperature, and, generally speaking, a fair amount of moisture. That the latter is one of the necessary factors for the growth of paspalum is evident from the miserable appearance this grass presents after a particularly dry period.

On the Clarence River paspalum thrives luxuriantly, both on the black and on the red soils. It is, however, not grown so extensively here as on the Richmond.

The light soils of Port Macquarie are not well adapted to its growth. On the flats, however, the grass grows well. The river and swampy flats on the Hastings and Manning Rivers grow paspalum luxuriantly. Land formerly occupied by she-oaks, bulrushes and sedges, has been converted into good paspalum pastures. The grass has proved to be of inestimable value in reclaiming such land. On one estate on the Manning River (Cundle Cundle) a paspalum pasture, 20 acres in extent, that had originated from swampy land, has carried forty head of stock for three months.

On the South Coast.

Very little paspalum is grown between Wollongong and Berry. On the flats at Berry and Nowra some fine pastures of this grass may be seen.

South of Nowra, paddocks laid down to paspalum are limited in number, but those laid down have proved very successful.

At Milton, fine paspalum pastures can be seen on the volcanic areas, and also on the sandstone. The soil formation of Tilba Tilba on the hill sides or on the flats suits the development of paspalum.

At Moruya, the prejudice to this grass is so strong that only one or two small paddocks can be seen.

At Bega, where the native grasses are mainly relied on for dairying, paspalum is little grown, but where it has been laid down on the flats it is doing extremely well.

Objections to Paspalum on the South Coast.

One of the main objections to paspalum is that it is said to spread too quickly into adjoining areas. Personal investigation, however, shows that it is not to be greatly feared on this score. From a paspalum paddock, twelve years old, only a few clumps had spread into an adjoining rye pasture. Even on the flats the line of demarcation between a paspalum paddock and adjoining areas was distinctly drawn, and no difficulty would be met with in suppressing the grass.

The two main elements that combat the spreading of paspalum on the South Coast are—

(1) Frosts, and

(2) The limited rainfall compared with that on the North Coast.

The deterrent action that frosts have on paspalum may be well seen in the New England district. Here the grass grows luxuriantly during three or four months of the year, but the intense cold of the winter months keeps it in check to such an extent that it is confined, for the most part, to the pasture where it was first laid down.

It is also claimed by some that cattle do not care for it, and do not milk well on it. This is an absurd conclusion, as may be easily proved by inspecting the cheques of the dairymen possessing paspalum pastures.

Another objection to paspalum put forward is that it is quickly eaten down, and takes a long time in starting again. From personal observation it appears that paspalum will stand as much stocking, under ordinary climatic conditions, as the native pastures. During dry weather it certainly takes a long time to start again after once being eaten down, but this is more than compensated by its quick response to rain. Of course, it is here assumed that the paspalum pasture is not too old and has not reached the deterioration stage.

Paspalum as a Dairying Factor on the South Coast.

There is not the same necessity for the laying down of paspalum pastures on such a big scale in these districts as on the Northern Rivers. For a considerable portion of the year cocksfoot and rye can be grown, and for the cooler months these grasses are more or less essential. But from about December to March cocksfoot and rye are practically dormant. This is the season when paspalum, under ordinary climatic conditions, is at its best. A paddock of this grass at this time is very useful, and it would probably be found that the increased milk yield from such a paddock would well repay the trouble of laying it down.

Paspalum on the North Coast.

The best paspalum paddocks on the Northern Rivers are those in the first few years of development. Paspalum pastures from twelve to sixteen years old are returning practically nothing. To what extent the pasture deteriorates may be shown by the fact that at Wollongbar Experiment Farm, a paspalum pasture sixteen years old, and from which stock had been excluded for nine months, made practically no growth. A number of different manures were applied to help it along, but the grass practically failed to respond to any. The reason for this deterioration is the tendency of the grass towards extraordinary root development. The root fibres lock and interlock to such an extent that a mat impervious to air and moisture is formed. The root development is too great in proportion to the size of the plant, and as a consequence, little moisture is allowed to penetrate.

It has long been realised that if these root fibres could be broken up in an effectual way the grass would receive a new lease of life, and in this connection some very useful experiments have been carried out at Wollongbar Experiment Farm. It was first decided to try one ploughing, using the mould-board. It was a stiff proposition to tackle, as fourteen bullocks could plough only one acre per day. The result was also disappointing. The root system was not cut up or divided enough, and the new shoots of grass, stunted in appearance, followed the furrows, and did not form a uniform sole. It is evident that such a pasture would deteriorate very quickly, and prove practically useless.

By disc ploughing twice (see Fig. 1), and fertilising with bone-dust and superphosphate, a much better and very encouraging result has been obtained. The old dead crowns have disappeared, the renewed vitality of the old roots has produced a uniform and healthy sole of grass, having the appearance of a freshly-laid down pasture.

The cost of such an experiment is not prohibitive. Mr. McMillan, manager of the Farm, has kindly supplied me with the following figures:—

COST of treating a 6-acre Paspalum pasture, 16 years old.

	£	s.	d.
Disc ploughing (twice)	3	12	0
Harrowing	0	14	0
Manuring (bone-dust and superphosphate)	2	5	0
Sowing manure	0	3	6
Second harrowing	0	14	0
Rolling	0	3	6
18 lb. of clover seed (3 lb. per acre) ...	1	7	6
Sowing clover seed	0	1	6
Total	£9	1	0

Cost per acre = £1 10s. 2d.

Disc ploughing 3 inches in depth is sufficient for the first ploughing, and 5 to 6 inches for the second ploughing.

The main object in such a treatment is to break up the root system as much as possible. That something like the above will have to be done is evident from even a superficial examination of the Richmond River pastures, and already dairymen are proceeding on these lines. On stony hill-sides where ploughing is impossible, the problem of rejuvenating paspalum has not yet been solved.

Paspalum Compared with Native Grasses.

Some interesting comparisons were made between paspalum and the native grasses On the hill sides, consisting of pipeclay or sandy soils, the native grasses were, if anything, superior. On the flats *Paspalum distichum* and couch grass are rival grasses to paspalum, particularly on the Northern Rivers. These grasses are just as drought-resisting as paspalum, but are at a disadvantage in the smaller bulk of feed produced.

Fig. 1. An old Paspalum pasture, disc-ploughed. Wollongbar Experiment Farm.

Fig. 2.—Rhodes Grass at Grafton Experiment Farm.

THE PASTURES OF THE COAST.

Fig. 3.—Cocksfoot Pasture at Moruya.

Fig. 4.—*Phalaris bulbosa* at Pambula.

The grass beyond the fence is 7 feet high. This will indicate how well it flourishes when left unstocked. The state of the grass in the foreground shows how it is relished by stock.

Clover with Paspalum.

In nearly all parts of the coast White clover grows successfully with paspalum. The best results are seen on the South Coast. There the clover grows remarkably well in association, and in some places comprises 50 per cent. of the pasture. The clover, besides aiding the soil in maintaining its fertility, provides good feed during the seasons when the paspalum is dormant.

Strawberry clover was also found to grow well with paspalum at Bega and at Cundle. Insufficient data are available at present to speak with confidence as to its success.

Rhodes Grass.

The cultivation of this grass has not been taken up in the same manner as paspalum. On the Richmond, Clarence, and Manning Rivers experiments are being carried out with it, but it is practically absent on the South Coast. A small plot was seen at Milton; it was shut off from stock, and was observed to be doing extremely well.

Rhodes grass has been found well adapted to newly cleared and burned land on hill sides. The seed sown in the ashes easily germinates. Unfortunately, the cattle show a decided preference for this grass as compared with native grasses, and it soon disappears unless nursed a little. It is pretty evident that on the lighter soils of the hill sides Rhodes is more suitable than paspalum.

On the flats the objection is made that it becomes rather harsh To a certain extent this is true, particularly if it is allowed to develop seed. At the same time there is evidence on the Manning River flats, and also at the Wollongbar Experiment Farm, that even when growing in tussocks stock readily eat the grass.

On the red soils at Grafton Experiment Farm Rhodes grass compares favourably with paspalum as regards bulk of food (see Fig. 2).

No definite information is as yet forthcoming as regards the success of the grass under stocking. In one paddock on the Manning River, where stock have access to the grass, it stands the stocking very well.

The drought-resisting qualities of Rhodes grass have been well shown during the dry period on the coast in the last summer. Where comparison can be made with paspalum the advantage invariably lies with the former.

There is plenty of scope for experiments with Rhodes grass in the paspalum districts. If the grass will stand feeding-off like paspalum, it will be a desirable acquisition.

Cocksfoot.

This is still a strong favourite with many dairy farmers. The greatest success with this grass is met with on the South Coast, and the best cocksfoot pastures on the coast may be seen at Moruya (see Fig. 3). In this district the grass grows remarkably well with white clover, and often produces a growth sufficient to be cut for hay. At Milton there are also good pastures for this grass. In most cases it appears as if the cocksfoot is

more permanent than rye grass. In an experimental plot at Milton, where a mixture of cocksfoot, Timothy, rye grass, prairie and clover were laid down about ten years ago, 80 per cent. is cocksfoot, and it is doing remarkably well.

At Bega very little cocksfoot is seen. It is growing well where sown, but at present the native grasses appear to satisfy all requirements.

Cocksfoot does well for the greatest part of the year on the flats on the Manning River. Here again it appears to hold the soil better than rye grass.

On the Northern Rivers cocksfoot can only hold a place as a rotation crop, as the hot summers prove too great a check to its permanence.

Rye Grass.

This is more largely grown on the South Coast than any other grass. On the lighter formations, as Dapto and Albion Park, it is evident that it requires frequent treatment, or otherwise it is soon overshadowed by the native grasses, principally couch and Parramatta grass.

On the alluvial flats at Moruya it grows extremely well. It is sown with Red clover, and presents a fine green growth, even in December.

On the basaltic formations of Milton some fine rye pastures may be seen. One pasture, 10 acres in extent, and laid down for twenty years, produced 100 bushels of seed during the last year. This is all the more remarkable when it is known that the pasture has had no treatment since its inception.

One disadvantage to the best development of rye grass on the South Coast is its tendency towards rust.

For nine months of the year rye grass can be strongly recommended for the South Coast. During the hot summer months the grass is dormant, except for a temporary green shoot after cool moist rains.

Phalaris bulbosa.

This grass has not yet attained popularity on the coast. Where it has been tried, however, the results are encouraging. In an experimental plot at Pambula the grass grows to perfection (see Fig. 4). As this grass makes its best growth in the cooler months of the year, there is plenty of scope for further trials with it. The grass is most succulent, and is relished by stock as much as, if not more than, any other grass.

Festuca elatior (Tall Fescue).

This grass is growing well in an experimental plot at Milton. Its tussocky habit is somewhat against it, and it also has a strong tendency towards ergotism. At present the grass is not held in great favour by dairymen.

Kentucky Blue.

Very little has been done with this grass, yet the results from sowing it are very encouraging. For example, at Milton, where it is sown with rye, it is doing extremely well.

Red Clover.

The soils of Moruya are well adapted to the cultivation of Red clover. It is cut both for hay and used as a pasture, and remains permanent for a few years. It does not succeed well on the sandstone or light soils.

Lucerne.

On the lower flat formations at Dapto there is evidence that lucerne does well. One paddock has been laid down for four years and is still producing a large amount of fodder. At Moruya a Government plot, three years old, and right in the centre of the town, could not provide a more striking object lesson of its success in that district. In one cut 4 tons were obtained from 1¼ acres.

This king of fodder plants is not tried extensively enough on the South Coast.

Many fine lucerne fields can be seen on all the rivers from the Hunter northwards.

Native Grasses.

Generally speaking, the grasses growing on the light soils along the coast form distinct associations. The grasses growing on the sandstone formations in the Illawarra district are similar to those growing on similar formations on the Hunter, Manning, and also the Clarence Rivers. The principal grasses in such an association are:—*Eragrostis leptostachya* (Paddock Love-grass), *Cynodon dactylon* (couch), *Sporobolus indicus* (Parramatta grass), *Andropogon pertusus* (Pitted Blue grass), *Microlæna stipoides* (Meadow Rice grass), *Panicum gracile*, and, in the scrub lands, *Panicum parviflorum*.

Eragrostis leptostachya produces a great bulk of feed on the Hunter, Manning, and Clarence Rivers. In drought-resisting qualities the grass compares favourably with couch grass. Dairy cows are said to milk well on it.

Sporobolus indicus (Parramatta grass).—This grass has too great a hold on the pastures in the Illawarra district, and on the South Coast generally. Although eaten by stock when young, it becomes harsh and tussocky with age.

Andropogon pertusus (Pitted Blue grass) is fairly common in Illawarra district, but rare between Nowra and Bega. At Bega it forms a large portion of the pastures. It is a grass that will stand a good deal of stocking, and makes a good pasture.

The grasses named above, together with couch, form the bulk of the native pastures on the lighter formations.

On the alluvial flats, and also on the basaltic formations, *Paspalum distichum* (water couch) grows to perfection, and must be considered a most valuable grass from all points of view.

Ordinary couch (*Cynodon dactylon*) also looms largely on the lower and richer formations, where it stands dry conditions well and provides a valuable acquisition to its associate—water couch.

Export of Australian Fruit to Netherlands India.

The Minister of Agriculture has received a communication from the Consul of the Netherlands, intimating that the Department of Agriculture, Industry, and Commerce in Netherlands India has been preparing a regulation for the prohibition or conditional importation of plants, parts of plants, and fresh fruit from abroad, in view of the dangers threatening the agricultural industries in Netherlands India, on account of the possible presence of fruit-flies or other injurious insects and plant diseases.

In connection therewith the above-mentioned Department has proposed to the Netherlands Indian Government to prohibit, from the 1st January, 1914, the importation into Netherlands India of fresh fruit originating from Australia, unless such fruit be accompanied by a certificate of approval, issued by an expert appointed for the purpose by the Director of Agriculture, Industry, and Commerce aforesaid. Any consignment of fruit which will be found affected with fruit-flies will be entirely destroyed.

The projected regulations concerning the importation into Netherlands India of fresh fruit from Australia will probably contain the following :—

Article 1.

1. It is prohibited to import into Netherlands India fresh fruit originating from Australia, unless the fruit has been inspected by an expert indicated for the purpose by the Director of Agriculture, Industry, and Commerce.
2. This prohibition also applies to the objects or material being used, or having been used, for the packing of the fruit concerned.
3. The inspection takes place exclusively in ports indicated by the Governor-General of Netherlands India.

Article 2.

1. The importer is obliged to inform the Director of Agriculture, Industry, and Commerce immediately of the arrival of a consignment of fresh fruit originating from Australia, and the Director causes an inspection of the condition of the fruit to be made as soon as possible by the expert mentioned in the first part of Article 1.
2. The obligation of notification referred to above also rests on the master of the ship by which the fruit mentioned in this article is transported.

Article 3.

The permission (in writing) for importation referred to in Article 1 is refused :—

(*a*) If the consignment of fruit submitted to inspection is not packed in new cases.

(*b*) If the consignment of fruit submitted to inspection is not accompanied by a certificate signed by an official expert of the Government of the country of origin, in which is stated that the consignment concerned when shipped from Australia was free from fruit-flies or other injurious insects or diseases.

(*c*) If fruit-fly (*Ceratites capitata*) or any other injurious insect or any disease is found in the inspected consignment.

Article 4.

The permit in writing referred to in Article 1 is given by the Director of Agriculture, Industry, and Commerce according to a prescribed form.

Article 5.

Every rejected consignment is destroyed in the manner indicated by the Director of Agriculture, Industry, and Commerce.

Article 6.

1. Infringement of any prohibitory or any other stipulation of this regulation will be punished according to the nationality of the offender with imprisonment or hard labour (without chain) of six days to three months or, if fined, from one guilder to 1,000 guilders, collectively or separately.
2. The consignment of fruit and the cases used therefor, or other means of packing with which the punishable act has been committed, may be confiscated.
3. The destruction of the fruit and cases or other means of packing may be ordered in the sentence, even in case of acquittal.

Article 7.—Concerns the officers for the prosecution.

Article 8.—The costs of inspection are charged to the importer, according to a tariff fixed by the Director of Agriculture, Industry, and Commerce.

Article 9.—Indicates the date on which the regulation comes into force, probably 1st January, 1914.

Flag Smut of Wheat.

(*Urocystis tritici*, Koern.)

G. P. DARNELL-SMITH, B.Sc., F.I.C., F.C.S.

THIS smut is most commonly found on the leaf blades, but it may occur on the stem, on the chaff, and rarely on the ovary.

The disease prevents the formation of the ear, and in crops where the disease is prevalent the yield may be seriously reduced.

The first indications of the disease upon a leaf are long lead-coloured streaks running parallel with the veins; later the epidermis ruptures and the lead-coloured streaks are replaced by black streaks, consisting of black powdery spores; hence the common name "Black Rust." Affected leaves often become curled and twisted up and generally wither early.

The spores drop from the leaves to the ground or pieces of the diseased leaves fall to the ground carrying the spores with them.

Infection takes place in the ground. The wheat plant is generally held to be infected at the seedling stage, or when the young shoots are formed.

The spores may occur singly, but more usually in spore clusters, consisting of one to five spores; each spore is covered partially, or sometimes completely, with a protective covering of small bladder-like appendages.

The spores do not germinate in water readily directly they reach maturity, but will do so readily after they have undergone a resting stage of a few months.

On germination each spore sends out a minute germ tube which, at its apex, produces from two to six secondary spores, each capable of sending out a fine germ tube and of infecting the host plant, if conditions are favourable.

A spore cluster may send out two or more germ tubes.

It is generally held that crops sown late in a moist seed-bed are less liable to be attacked than those sown earlier. The explanation seems to be that if wheat be sown in infected soil that is dry, both wheat and spores germinate together when rain comes and infection takes place; but if the soil has been moist some time before the wheat is sown, any spores therein will have germinated, and, failing a suitable host, will have perished.

Pot experiments go to show that infection takes place not only when the flag-smut spores adhere to the grain, but also when the spores are distributed through the soil, since the spores themselves can germinate in damp soil producing germ tubes terminated by secondary spores, and these secondary spores can again produce elongated infection threads.

Under these circumstances it is not surprising that the usual treatments for preventing wheat from becoming infected with bunt do not always prevent it becoming infected with flag smut.

Nevertheless such treatment does act in a large measure as a preventive, and since flag-smut may become a source of seriously decreased yields, and in some cases has already done so, "pickling" of seed wheat should never be neglected. The advantages of "pickling" wheat as a preventive against infection by flag smut were demonstrated in some experiments carried out by Mr. Peacock, manager of the Bathurst Experiment Farm, in 1912, and these results were published in the *Agricultural Gazette* for March, 1913. Experiments on similar lines have been conducted during 1913, by Mr. Pridham, at the Cowra Experiment Farm. The results of these experiments are given below.

Results at Cowra.

Mr. Pridham's report states:—

The seed used was hand-picked to get rid of defective grains. The soil was uniform and in good condition for germination at time of sowing. The treatments in each case were carried out and the plots all sown on 12th June.

The infection of the seed sown in plots 151 to 163 (f), inclusive, was done by shaking the seeds vigorously in a small box with a uniform quantity of the spores (black powder) obtained from crushed diseased leaf. The effect was to blacken the surface of the grains.

The rainfall during the time of the experiment was:—May 26 to 30, 106 points; June, 188 points; July, 22 points; August, 79 points; September, 98 points; October, 244 points. Inspections were made at intervals. The plants began to ripen off early in November.

TABLE giving Details of the Experiments.

Variety—Federation.

Plot	Treatment	No. of Plants Diseased	No. of Plants Free	Total.	Remarks.
151 (f)	Seed steeped 5 minutes in bluestone 2 per cent., then 5 minutes in superphosphate 10 per cent., then dried and infected.	14	159	173	These two rows did not germinate any better than 155-163 (f).
153 (f)	Infected, soaked 5 minutes in bluestone 2 per cent., then 5 minutes in superphosphate 10 per cent., dried, and sown.	2	165	167	
155 (f)	Treated with Fungusine, dried, and infected.	41	129	170	
157 (f)	Infected, then treated with Fungusine.	96	72	168	
159 (f)	Soaked in 2 per cent. bluestone 5 minutes, then limewater 5 minutes, dried, and infected.	9	162	171	
161 (f)	Infected, dipped in bluestone 2 per cent. 5 minutes, then limewater 5 minutes.	2	167	169	
163 (f)	Infected with flag smut.	79	90	169	

Wheat leaves showing black streaks where the spores of Flag Smut are breaking through the epidermis.

The results of these experiments serve to emphasise the necessity for pickling. The use of bluestone followed by lime is well known as a bunt preventive, and here in the case of flag smut—a disease which is showing some signs of becoming serious—the treatment reduces the number of diseased plants, produced from seed purposely infected, to a minimum. In other words, judicious "pickling" reduces both the liability to disease from bunt and from flag-smut.

"Downy Mildew" on Cabbage and Cauliflower Seedlings.

A correspondent recently informed the Department that all his cabbages and cauliflowers had gone off suddenly, and asked for a possible remedy.

In reply, the officers of the Biological Branch stated that the disease is due to the fungus *Peronospora parasitica* (Pers.), De Bary. This produces "Downy Mildew" or whitish mould on many cruciferous plants, and a "damping off" in the seed beds. The fungus produces two forms of spores, namely: (1) large thin-walled spores, which are borne in the air in great numbers on branched stems, and (2) thick walled resting spores. The first rapidly spread the disease among the seedlings, while the second are resistant, and can withstand unfavourable weather and soil conditions for long periods and re-establish the disease when favourable conditions return.

In the seed-bed the plants are often crowded, thus shading the stems of one another, and preventing the free circulation of air. Thus, with a liberal supply of moisture and the right temperature, the fungus grows and spreads rapidly.

The treatment must be preventive. The seed should not be sown too thickly or the seedlings kept too wet. A free circulation of air around the plants and exposure to sunlight will help to restrict fungi. The same seed-bed should not be used for the next sowing of cruciferous seed, unless disinfected. This can be done by turning up the soil to the sun and air, and treating it with formalin (1 in 100) at the rate of about 1 to 1½ gallons to a square yard. Do not sow for at least a fortnight after treatment. It would be advisable to use a new seed-bed altogether for cruciferæ.

As several cabbage diseases are spread by infected seed, it would pay to treat all seed sown. This is done by soaking for 15 minutes in formalin (1 in 250), then washing in clean water and drying. Sprinkling the seed bed with Bordeaux (4–4–50), using 1 gallon of the mixture to a square yard, immediately after sowing, has proved non-injurious to the seed and germination, and greatly preventive of fungous diseases.

The young seedlings can also safely be sprayed with weak Bordeaux about two or three weeks later.

Harvest Reports, 1913-4.

COONAMBLE EXPERIMENT FARM.

A. H. E. McDONALD, Manager.

THE wheat crops on this Farm were all cut for hay, and very satisfactory results were obtained. The first three months of the growing season were very favourable to growth, but in June serviceable rain ceased, and a very dry spring and summer ensued. The season was made more adverse to crops by the exceptionally strong, dry, hot winds which prevailed during the spring. The direct consequence of the peculiarities of the season was that early-sown crops made very good growth, whilst the late sown crops were short. The yield of the latter was reduced somewhat, also, by the land being flooded by the heavy winter rains for a considerable time just after sowing, and which interfered seriously with the germination of the seed.

The rainfall during the season was—

April	2·34 inches.	August ...	0·52 inches.
May	3·31 „	September ...	0·43 „
June	2·25 „	October ...	1·14 „
July	0·56 „		

As all the early-sown crops were harvested during September, they received no benefit from the useful rains which fell in October.

The following are the details of the crops:—

PADDOCK No. 1.

Variety.	Area.	Quantity of Seed per acre.	Fertiliser.	Date Sown.	Date Harvested.	Yield per acre.
	acres.	lb.	lb.	1913.	1913.	t. c. q. lb.
Zealand	3	41	38	17 April	26 September	2 5 0 0
„	3	41	nil.	17 „	26 „	2 4 1 10
Warren	$2\frac{2}{3}$	44	38	17 „	16 „	2 16 0 0
„	3	44	nil.	17 „	16 „	2 12 0 0
Bobs	$2\frac{7}{10}$	35	38	18 „	17 „	2 12 0 0
„	$2\frac{7}{10}$	35	nil.	18 „	17 „	2 15 0 0
Federation	3	$40\frac{1}{2}$	38	18 „	9 „	2 11 2 9
„ ...	3	$40\frac{1}{2}$	nil.	18 „	9 „	2 2 0 0
Yandilla King ...	3	42	38	17 „	18 „	1 18 2 9
„ ...	3	42	nil.	17 „	18 „	1 15 0 0
Bayah	$2\frac{7}{10}$	42	38	19 „	15 „	2 0 0 0
„	$2\frac{7}{10}$	42	nil.	19 „	15 „	2 2 0 0

The total area cut for hay was 35 acres, with a total yield of 79 tons 6 cwt., and an average yield per acre of 2 tons 5 cwt.

PADDOCK No. 6.

Each variety received 37 lb. of fertiliser per acre.

Variety.	Area.	Quantity of Seed per acre.	Date Sown.	Date Harvested	Yield per acre.
	acres.	lb.	1913.	1913.	t. c. q. lb.
Marshall's No. 3 ...	32½	29	4 April ...	22 September ..	2 2 3 0
John Brown ...	27½	40	14 ,, ...	24 ,, ..	1 16 0 0
Rymer	25	35½	16 ,, ...	30 ,, ...	1 14 3 0
Thew	22	48¾	17 June ...	24 October ...	0 12 2 0

The total area cut for hay was 107 acres, with yield of 176 tons 7 cwt. 2 qrs., and an average yield of 1 ton 13 cwt. per acre.

PADDOCK No. 10.

Each variety received 37 lb. of fertiliser per acre.

Variety.	Area.	Quantity of Seed per Acre.	Date Sown.	Date Harvested.	Yield per Acre.
	acres.	lb.			c. q. lb.
Steinwedel... .. Comeback ... .. Firbank	63	50	23 May to 16 June.	16 October to 23 October.	12 3 0

Oats.

Five acres were sown on 3rd April and 5 tons of hay cut from the area, but the product was of poor quality. The climate does not appear to be suited to oats.

Cape Barley.

Thirty-five acres of barley and rape in alternate drills were sown, commencing on 12th March. The barley grew luxuriantly, and ultimately smothered the rape. In August 30½ acres of barley were cut, and the material converted into silage, a yield of 8 tons of greenstuff per acre being obtained.

Four and a half acres of Cape barley were left for grain, and when stripped gave 145 bushels of grain, an average of almost 33½ bushels per acre.

Conclusions.

Considering that the season has not been a normal one, the results are very encouraging. The quality of the hay was good, and chaff from it has brought very satisfactory prices.

The results have proved that early sowing must be practised and that early varieties must be selected. This, combined with a system of careful soil cultivation to conserve moisture, and thin seeding, so that the number of plants will be in proportion to the moisture available, will almost certainly lead to success with the wheat crop in these dry Western districts.

The total area cut for hay on the Farm was 215 acres, the yield being 301 tons, giving an average of 1 ton 8 cwt. per acre.

The following are the details of the sales of chaff to the 20th March:—

The consignments to Sydney after paying commission, &c., which averages 8s. 6d. per ton, gave an average of £4 14s. 2d. per ton. Freight, which is 11s. 8d. per ton, has to be deducted from this, leaving a net return on rail at Coonamble of £4 2s. 6d. per ton.

	£	s.	d.	t.	c.	q.	£	s.	d.
Sold at Sydney	......			60	12	2	280	12	8
Sold locally at	4	10	0	78	16	3	354	15	3
"	4	5	0	22	11	2	95	18	10
"	4	0	0	16	17	2	67	10	0
Transferred to Berry Experiment Farm (on rail) at	4	10	0	23	14	1	106	14	2
Used at Stable	3	10	0	6	15	0	23	12	6
Reserved for stable use, at	3	10	0	53	19	1	188	17	6
Balance on hand, valued at ...	3	10	0	37	13	1	131	16	6
Total				301	0	0	£1,249	17	5

COWRA EXPERIMENT FARM.

M. H. REYNOLDS, Manager.

THE following is a summary of the crop results for the past season:—

Crop.	Area.	Yield.	Average Yield per acre.
Wheat for Grain—	acres.		
Experiment area	60	995 bus.	16½ bus.
Other area	90	1,382 ,,	15⅓ ,,
Wheat for Hay—			
Experiment area	6½	10 tons	30 cwt.
Other area	7½	9 ,,	24 ,,
Oats for grain	21	436 bus.	20¾ bus.
Oats for hay	2½	2¼ tons	18 cwt.
Oats for silage	3½	10 ,,	3 tons
Skinless barley for silage	5	15 ,,	3 ,,

The wheat and oat grain weights mentioned are the weights from the grader, and include 1st, 2nd, and 3rd quality cleaned free from dust.

The average wheat yield was considerably reduced by the yields of Bunyip and other early-maturing wheats in both the Experiment and Demonstration Areas. The total rainfall from 1st January to 31st October, 1913, was 1,532½ points, which fell during fifty-nine wet days.

Insectivorous Birds of New South Wales.

[Continued from Volume XXIV, page 389.]

WALTER W. FROGGATT, F.L.S., Government Entomologist.

87. The Silver Eye (*Zosterops cærulescens*).

THESE quaint little birds are well known in our suburban gardens, and might almost be considered semi-domesticated, they are so tame and fearless, when hunting through the rose bushes and shrubs for aphides, small moths, and other soft-bodied insects. They are popularly known as "Silver Eyes" or "White Eyes," on account of the curious ring of small white feathers round the eye, which gives them a rather comical but characteristic appearance. The Sydney school boy, who often clips his words, is content to call them just "Sivies." This species has a wide range around the Australian coast from South Australia to Queensland, but, though occasionally recorded from inland districts, it is only a stray visitor over the western side of the Mountains. The writer has seen them in Bendigo, Victoria, and they have been noted as far north-west as the Murray. They have a wide range over Tasmania, and are established in New Zealand, where they were first noticed in 1856. There is some question as to whether they are indigenous, or emigrants from Australia, but as they are also common in Fiji, New Caledonia and the New Hebrides they may be natives of all these islands.

A second species, *Zosterops gouldi*, which takes the place of the species common in Western Australia, is known as the "Grape" or "Fig Bird." Though an insectivorous bird all through the winter months and early summer when insect pests are at their worst, the "Silver Eye," like a number of other honey suckers belonging to the family *Melamphaginæ*, has adapted its habits to its surroundings, and finds its curious brush-tipped tongue (which should be used for brushing up the honey on the flowers of the honey-suckles and other native flowering shrubs) admirably adapted, in conjunction with its sharp-pointed beak, for sucking up the juices of grapes, persimmons, figs, and other dead ripe fruit. Though sometimes spoken of as "the blight bird," on account of its aphis-eating habits, it is also well known as a pest in summer, when, gathered together in little flocks of half a dozen or more, they appear among our grape-vines.

One of the writer's earliest recollections of bird life is, when a very small boy, seeing his father, in an orchard near Melbourne, catch a Silver Eye in a large ripe pear, which it had, with its friends, nearly hollowed out on the tree.

The Silver Eye is one of the smallest of the honey-eaters, of a general olive green colour, the back tinted with dark grey and the under surface lighter coloured; it is short and somewhat thick-set in form, and has a short whistle-like cry when flitting through the bushes by which its presence

can be easily located. It forms a rounded cup-shaped nest, composed of grass, wool, and such like material in any low bush, in which it lays three delicate pale blue eggs, and it is not uncommon to find the speckled egg of the cuckoo also in the nest.

The Silver Eye must be included in any list of insectivorous birds, on account of the valuable work it does in destroying countless numbers of minute insect pests, but at the same time we must allow that in a trellis of unsheltered grape-vines he is a cunning little thief, and can do a considerable amount of damage.

38. The White-winged Chough or Black Magpie
(*Corcorax melanorhamphus*).

This bird is known under several different names. In the open forests of Northern Victoria we used to call him the "Black Magpie" or the "Chattering Jay," both of which give one some idea of the bird.

This is not a coastal bird but is found in open forest land and ranges in the interior, where, in family parties of from five to a dozen or more, they scatter over the ground, turning over bits of bark, sticks, and leaves as they move along, with their curious, harsh chattering cry, with a mournful wailing note quite unlike any other birds of the forest. When disturbed they fly up into the trees, their jet black plumage showing up the large white patch in the centre of the wing which is hidden when at rest. Their somewhat large tails seem to overbalance them as they settle on a branch, and their bright red eyes give them a very alert look as they peer down at you from the branches above.

The writer was first acquainted with the Black Magpie in the forest covering the low granite Terrick and Mount Hope Ranges in northern Victoria, and has met them in many parts of western and northern New South Wales, lately all along the Barwon River; while they are well known in South Australia and Queensland.

Their nesting habits are remarkable, for they are among the few large birds that use clay for making their nests. These are constructed like a rounded basin, nearly 9 inches in diameter and slightly over 6 inches in depth. The clay used in their construction is usually matted together with grass stalks, and well lined with feathers. The number of eggs laid is variable, ranging from five to eight, which are dull white, thickly blotched with dull slate colour and olive brown. The nesting time is from August to December. In its native state the Black Magpie seldom leaves the open forest or river banks to which its hunting is confined, and where a flock must destroy an enormous number of insects every year.

INSECTIVOROUS BIRDS OF NEW SOUTH WALES.

"THE WHITE EYE OR SILVER EYE."

Zosterops cœrulescens

INSECTIVOROUS BIRDS OF NEW SOUTH WALES.

"THE WHITE-WINGED CHOUGH"
(The Black Magpie or Chattering Jay).
Corcorax melanorhamphus.

Potato Experiments, 1913.

GRAFTON EXPERIMENT FARM.

W. D. KERLE, Experimentalist.

EXPERIMENT No. I.—VARIETY TRIAL.

Object.

To ascertain the most suitable varieties of potatoes to grow, from a commercial standpoint, in the Clarence River District.

Varieties Tested.

The varieties tried in this experiment number thirteen, inclusive of the "check" variety, as shown in Table I.

Check Variety.

For all check and buffer plots Satisfaction was employed. A much larger acreage of this variety is grown in this district than any other, and under good seasonable conditions this has proved to be a good yielding mid-season sort.

The Block.

(*a*) *The soil:* The soil on which this experiment was conducted consists of a black alluvial loam of a clayey nature and which, as far as can be judged by mere inspection, is even in character.

(*b*) *Rotation employed:* The rotation adopted on this area is a simple two-course one, (1) Maize and (2) Potatoes. This is the one usually practised in the district.

(*c*) *Previous history:* This block is portion of a farm which has been cultivated for a good many years. It was put down to lucerne three years ago but was ploughed out and sown with maize in 1912.

Dimensions of the Plots.

As shown in Table I each plot has a length of 5½ chains and a width of 8 links. Thus each variety occupied an area of ·44 square chains and was planted in two rows 4 links apart, and separated by 4 links from the two adjacent plots. Buffer plots, sown on each side of the experiment, were of the same dimensions.

Preparation for Planting.

The whole paddock (No 8 bordering Alumy Creek—area, 7¾ acres) was ploughed with a double disc to a depth of 6 inches during the week ending 19th July, and on the 23rd of the same month rolled and harrowed. Rain fell on the 24th and the harrows were used crossways on 1st August and the disc cultivator on the 2nd. The ground at planting was thus in a loose, open, friable condition, with an abundance of moisture.

Fertilisers.

No artificial fertilisers were used with this Experiment.

The Seed.

The seed was obtained from different sources and was not uniform in size or condition of sprouting.

Satisfaction was on the small side, but was well shot and free from disease. Manhattan, Commonwealth, and Early Vermont were exceptionally large and well sprouted, but the latter contained a large percentage of diseased tubers. Adirondack, Burbank, and Up-to-Date were of good size but unsprouted, a fair number of the latter being blighted.

The remaining varieties were of medium size and well sprouted.

In place of another variety, which was not obtainable, a variety was obtained locally. This went under the name of Commonwealth, but it turned out to be Coronation.

The tubers were cut the day previous to planting and the sets were sprinkled with air-slaked lime to prevent bleeding and to allow the raw surfaces to heal. These sets were made as uniform in size as possible, each containing at least two good eyes and weighing approximately 2½ oz.

The Planting.

The "sets" were ploughed in on 11th August, being dropped every 15 inches and at a depth of 5 inches, immediately after the plough and in every third furrow, a distance of 4 links. The "sets" were placed on the side of the furrow, and covered immediately, undue exposure to the sunlight being avoided as much as possible.

The Germination.

The germination was not uniform. Satisfaction, Early Rose, Cambridge Kidney, Commonwealth, Coronation, Surprise, Queen of the Valley, and Bliss' Triumph germinated excellently, with few misses; Manhattan was not so good, and Adirondack, Burbank, and Up-to-Date were only fair. Early Vermont was worst of all, and quite unsatisfactory.

The Season.

This season in the Clarence River district was anything but satisfactory for potato production.

The splendid winter rains gave ample moisture at time of sowing, and for the first month ideal conditions obtained. September, October, and November were comparatively dry and hot, the falls of rain being followed by hot drying winds almost immediately, which counteracted the benefits of the fall. A particularly mild winter, practically free from frosts, was conducive to the multiplication of insect life, and the young plants were attacked at times, in a greater or lesser degree, with aphides, caterpillars (chiefly the Looper-caterpillar, *Plusia verticillata* and the larval form of *Lita solanella*), Rutherglen bug (*Nysius vinitor*), and the potato moth (*Lita solanella*).

These were controlled, in a measure, by the application of arsenate of lead, at the rate of 2 lb. to 50 gallons of water, by means of the spray cart.

The following is the rainfall table from seeding to harvest:—

August	14	points.
September	401	„
October	59	„
November	214	„
Total	688	„

Although the last three weeks of August were dry, temperatures were low, while, on the other hand, the good falls in September were followed by hot days and drying winds. October was dry and hot, and the November fall of 214 points was the result of a storm of short duration on the 21st, and which actually came too late to be beneficial.

After-treatment.

A few days before the young shoots made their appearance, the disc cultivator, with very little "set," was run cross-ways over the experiment. This killed a thick coating of young weeds, and left a loose surface for the young plants to penetrate through. The Planet Junior cultivator, with broad knife attachment on behind, was run through on 18th September and 7th October. Hilling was carried out with the same implement with side-sweep attachments on 14th October. Owing to a heavy rainstorm, and subsequent drying winds leaving the ground dry and cracked, the cultivator, with hilling sweeps, was again employed on 5th November. This had the effect of breaking up the surface, and preventing to a large extent the ingress of the potato moth, which at this time, and right up to harvest, was particularly active.

Maturity.

Observations on maturity placed the varieties under trial in the following stages:—

Early Varieties.—Early Rose, Early Vermont, and Bliss' Triumph.

Mid-season Varieties.—Satisfaction, Up-to-Date, Adirondack, Cambridge Kidney, Manhattan and Burbank.

Late Varieties.—Surprise, Queen of the Valley, and Coronation.

Notes on Growth.

Throughout the experiment the "check" plots of Satisfaction were conspicuous by their sickly appearance and backwardness, in contrast with the other varieties. The haulms were sparse, and grew slowly, and the leaves curled up through aphis attack. Generally speaking, the condition of this variety was unsatisfactory. Coronation (and "Commonwealth") and Manhattan grew luxuriantly to a height of 2 feet 6 inches, and covered the ground. All other varieties grew well considering the season.

Harvesting.

The experiment was harvested on 2nd December, the haulms at that date being practically dead, and it being expedient to harvest as soon as possible, owing to very hot weather and the attack of the potato moth. A length of 26 links was cut from both ends of each plot and discarded for comparative purposes, the remainder, $\frac{1}{25}$ of an acre in area, being utilised for the estimation of yields. The tubers were ploughed out with a single furrow mould-board plough.

Results.

The potatoes were weighed in the field, and the results obtained, together with the actual and percentage yields, are given in Table I.

The percentage yields of the various varieties in order of merit are as follow :—

Commonwealth	221·7	Same variety, average, 213·8.
Coronation	205·8	
Manhattan	192·8	
Bliss' Triumph	146·2	
Queen of the Valley	142·1	
Early Rose	130·9	
Cambridge Kidney...	130·7	
Surprise	103·0	
Satisfaction	100·0	
Burbank	93·1	
Adirondack	91·0	
Early Vermont	84·3	
Up-to-Date	69·4	

Quality of the Tubers.

The quality of the potatoes obtained is as follows :—Coronation (and "Commonwealth"), rather variable in size, requiring close grading; Manhattan, extra large and uniform, requiring very little grading; Bliss' Triumph, Early Rose, Burbank, Adirondack, Early Vermont, Up-to-Date, Surprise, and Queen of the Valley, medium size, not much grading necessary; Cambridge Kidney, uniform in size, and borne in profusion, but too small; Satisfaction, variable in size, grading necessary.

Comments.

Characteristic of this experiment is the failure of Satisfaction. This variety has given very unsatisfactory results all through the Clarence River district, as a whole, this season. Manhattan is the only other variety grown to any extent, and growers of that sort have fared much better. As they are considerably in the minority, the district average is low.

The chief benefit of the Clarence River district for potato production lies in its ability to be first on the Sydney market with new potatoes. Consequently, early varieties are of primary importance, as, usually, the earlier they can be landed the higher the price obtained, in fact, they are often dug green with this end in view.

For this reason Manhattan, being earlier than Coronation, is considered the more profitable for the district, and also because much less grading is required. Coronation has also a very noticeable predilection for a second growth.

Following on these two varieties are Bliss' Triumph and Early Rose, both early sorts, and good reliable yielders. Queen of the Valley, although a heavy yielding variety, is too late for this district if early marketing is the object. The failure of Burbank, Up-to-Date, Adirondack, and Early Vermont was due, to a large extent, to inferior and unsprouted seed, and particularly is this regrettable in the last-named variety, which has a good reputation locally.

TABLE I.—Showing Results of Experiment No. I.

POTATO VARIETY TRIAL, 1913.

Length of plots, 5·5 chains; width of plots, 8 links; area harvested, $\frac{1}{25}$ acre.

No. of Plot.	Variety.	Yield per Plot.	Yield per Acre				Percentage Yield
			tons	cwt.	qrs.	lb.	
1. (*check*)	Satisfaction	260	2	18	0	4	100·0
2. ...	Early Rose	340	3	15	3	16	130·9
3. ...	Adirondack	236	2	12	2	20	91·0
4. (*check*)	Satisfaction	259	2	17	3	7	100·0
5. ...	Burbank	248	2	15	1	12	93·1
6. ...	Up-to-Date	190	2	2	1	18	69·4
7. (*check*)	Satisfaction	281	3	2	2	25	100·0
8. ...	Cambridge Kidney	348	3	17	2	20	130·7
9. ..	Commonwealth . ..	558	6	4	2	6	221·7
10. (*check*)	Satisfaction	237	2	12	3	17	100·0
11. ...	Early Vermont	205	2	5	3	1	84·3
12. ..	Manhattan	480	5	7	0	16	192·8
13. (*check*)	Satisfaction	255	2	16	3	19	100·0
14. ...	Queen of the Valley ...	365	4	1	1	25	142·1
15. ..	Coronation	533	5	18	3	25	205·8
16. (*check*)	Satisfaction	261	2	18	1	1	100·1
17. ...	Bliss' Triumph . .	369	4	2	1	13	146·2
18. ..	Surprise	251	2	16	0	3	103·0
19. (*check*)	Satisfaction	235	2	12	1	23	100·0

NOTE.—The percentages are not calculated by comparing the yields of the plots one with another, but by comparing the differences which exist between the actual yields of the plots and the yields which it is estimated they would have produced had they been planted as check plots. This estimate of "natural" yield is based upon the assumption that the differences between neighbouring check plots are due to regular and similar variations in the soil between them. The natural yield of any plot will, therefore, be intermediate between that of its two check plots, and proportionate to its distance from them.

EXPERIMENT No. II.—DEPTH OF PLANTING.

Object.

To determine the effect upon the yield of potatoes through planting "sets" in drills of various depths.

The following points were similar to those in the foregoing experiment:—

1. The Block ... { (a) The Soil. (b) Previous History. (c) Rotation.
2. Dimensions of Plots.
3. Preparations for Planting.
4. The Season.
5. After Treatment.

The Variety.

The variety of potato used was Satisfaction for all plots, being that favoured in the district for general cultivation.

Arrangement of Plots.

This is shown in Table II. "Check" plots consisted of Satisfaction, sown at a uniform depth of 5 inches.

The Seed.

The tubers of Satisfaction were rather small, with short, robust sprouts, and were cut to medium-sized "sets," weighing about 2 oz., and containing two or three good eyes. The cut surfaces were sprinkled with air-slaked lime, to assist in healing the raw surface of the set.

Seed per Acre.

About 8 cwt. of seed was used per acre.

Planting.

This took place on 8th August. The sets were dropped by hand 15 inches apart behind the plough, and immediately covered. The different depths were obtained by raising or lowering the wheel standard to the required depth. Rows were 4 links apart.

Germination.

The germination was very satisfactory and uniform throughout.

Notes on Growth.

On the whole the growth of the experiment was not satisfactory, the check plots, however, being superior to the other plots, particularly the greater depths. Sets planted 3 inches deep were very good, only a shade worse than the "checks," but better than the 4-inch.

As in the variety trial, the attack of insect pests was bad, more damage being done in this experiment, if anything, than in the former. All plots of Satisfaction seemed to be very susceptible to aphis attack this season.

Harvesting.

A length of 25 links was cut off each end, and the remaining two rows, each 5 chains long, dug and used for estimating the yield. The area of plot thus harvested was $\frac{1}{25}$ of an acre. The crop was ploughed out on 1st December.

Results.

The results of the weighing in the field, and the actual and percentage yields, are given in Table II.

The percentage yields in order of merit are as follows:—

Sets	planted	5	inches	deep	=	100·0	per cent.
"	"	3	"	"	=	80·9	"
"	"	4	"	"	=	71·4	"
"	"	7	"	"	=	65·1	"
"	"	6	"	"	=	54·6	"

Comments.

Although sets planted 5 inches deep have given the best results this season, no fixed rule can be laid down as to the best depth of planting, as everything depends on the character of the season as regards moisture. Consequently, a medium depth of about 5 inches affords less risk in an adverse season, and in this district, where the potato moth (*Lita solanella*) is so prevalent, it is not safe to plant shallow, it being most noticeable this season that the tubers were most badly attacked as the depths of planting became shallower.

TABLE II.—Showing Results of Experiment II.

DEPTH OF PLANTING TRIAL.

Length of plots, 5·50 chains; width of plots, 8 links; area harvested, $\frac{1}{25}$ acre.

No. of Plot.	Method of Planting.	Yield per Plot.	Yield per Acre				Percentage Yield.
			tons	cwt.	qrs	lb.	
1. (*check*)	Sets, 5 inches deep	346	3	17	0	26	100·0
2. ..	" 3 " " ...	273	3	0	3	21	80·9
3. .	" 4 " " ..	235	2	12	1	23	71·4
4. (*check*)	" 5 " " .	321	3	11	2	17	100·0
5 . .	" 6 " "	180	2	0	0	20	54·6
6. ...	" 7 " "	220	2	9	0	12	65·1
7. (*check*)	" 5 " "	346	3	17	0	26	100·0

Average yield per acre, 3 tons 1 cwt. 1 qr. 1 lb.

EXPERIMENT No. III.—SIZE OF "SET" TRIAL.

Object.

To ascertain, by the effect on the ultimate yield of potatoes, the most economical size of "set" to employ in planting.

The following points were dealt with in Experiment I, which are similar for this experiment:—

1. The Block— (*a*) The Soil. (*b*) The Previous History. (*c*) The Rotation.
2. Dimensions of Plots.
3. Preparation for Planting.
4. After Treatment.
5. Season.
6. Artificial Fertiliser.

Variety Employed.

Satisfaction was used throughout this experiment.

The Seed.

The seed tubers were made into three grades, as follows:—

1. Large tubers from 2 inches to 3 inches in diameter.
2. Medium „ „ $1\frac{1}{4}$ „ 2 „ „
3. Small „ below $1\frac{1}{4}$ inches in diameter.

One plot of each grade was sown whole and one plot of each cut once longitudinally. A seventh plot consisted of large tubers cut once longitudinally and then crossways, making four sets per tuber. The raw surfaces of the sets were sprinkled with lime to prevent bleeding.

Seed per Acre.

The approximate quantity of seed sown per acre was as follows:—

Large whole tubers	= 28 cwt.	Medium cut tubers	= 9 cwt.
Medium „ „	= 18 „	Small „ „	= $4\frac{1}{2}$ „
Small „ „	= 8 „	Large, cut four times	= 7 „
Large cut „	= 14 „		

Planting.

The different-sized sets were dropped by hand in their respective plots on the 7th August behind the plough, 15 inches apart and 5 inches deep. They were placed on the side of the furrow to prevent trampling by the horses, and covered directly with the succeeding furrow.

No check plots were sown in this experiment. Buffer plots were sown on each side.

Notes on Growth.

Germination was satisfactory throughout and quicker in plots with cut tubers. The plot, "large tubers cut once," predominated to within a few weeks of harvesting in luxuriance of haulm, and was ready to dig a week earlier than any of the uncut plots. The three grades coul l be very plainly distinguished throughout, both with the cut and uncut plots, the larger the set the more luxuriant the growth.

Harvesting.

A length of 25 links was discarded as in Experiments I and II, and the results obtained from $\frac{1}{25}$ acre are shown in Table III. Date of harvesting, 28th November, 1913.

Results.

Results, in order of merit, are as follow:—

1.	Large, whole sets	=	4	tons	7	cwt.	0	qrs.	6	lb.
2.	„ cut once	=	4	„	5	„	1	„	27	„
3.	„ cut four times	=	4	„	4	„	3	„	8	„
4.	Medium, whole sets	=	4	„	0	„	0	„	15	„
5.	„ cut once	=	3	„	7	„	1	„	18	„
6.	Small, whole sets	=	3	„	5	„	4	„	8	„
7.	„ cut once	=	2	„	14	„	1	„	24	„

Comments.

An analysis of the results reveals, in a striking manner, the superiority of the large tubers, whether cut or uncut, over the smaller tubers for seed purposes. Although "large whole" and "large cut," once longitudinally each, show a slightly increased yield over large tubers 2 inches to 3 inches in diameter, cut four times, the latter is undoubtedly the most economical set to employ in planting. The much greater quantity of seed required per acre in the former does not compensate for the small increase of yield, in view of the high price of seed in this district.

No check plots were sown with this experiment, but in order to test the uniformity of the ground the buffer plots were weighed. Buffer plot next to plot No. 7 was between Experiments Nos. II and III, and the increase of yield between this plot and that next to plot No. 1 may be assumed to be due to outside influences, this latter plot being on the outside of Experiment No. III. These buffer plots were sown with Satisfaction 5 inches deep and medium-sized cut sets, but not necessarily cut from medium sized tubers. They were the same distance apart in rows and drills as the other plots.

Complete results are tabulated in Table III.

TABLE III.—Showing Results obtained in Experiment III.

"SIZE OF SET" EXPERIMENT.

Length of plots, 5·50 chains; width of plots, 8 links; area harvested, $\frac{1}{25}$th acre.

No. of Plot	Size of "Set."	Plot Yield.	Yield per Acre			
		lb.	tons	cwt.	qrs.	lb.
...	BUFFER PLOT	335	3	14	3	3
1	Large whole tubers	390	4	7	0	6
2	Medium whole tubers	[illegible]	4	0	0	15
3	Small whole tubers	296	3	6	0	8
4	Large, cut once	383	4	5	1	27
5	Medium, cut once	302	3	7	1	18
6	Small, cut once...	244	2	14	1	24
7	Large, cut four times	380	4	4	3	8
...	BUFFER PLOT	346	3	17	0	26

EXPERIMENT No. IV.—POTATO MANURIAL TRIAL.

Object.

To determine the effect upon the yield of potatoes by the direct application of simple and mixed fertilisers to alluvial soil in the Clarence River District.

Fertilisers Tried.

The following fertilisers were tried separately and in conjunction with each other:—

Superphosphate, supplying phosphoric acid.
Sulphate of potash, supplying potash.
Sulphate of ammonia, supplying nitrogen.
Bone-dust, supplying phosphoric acid and nitrogen.

The following items are similar to those dealt with in previous experiments: (1) Soil; (2) Rotation; (3) Preparation for planting; (4) Season.

Previous History.

The previous history of the block on which this experiment was conducted is similar in most respects to that of Experiments I, II, and III, but in place of maize a crop of potatoes was taken off in spring 1912. This can account in a measure for the low yields of the experiment, which would have been sown elsewhere if ground had been available.

The Variety.

The variety of potato used for this experiment was Satisfaction.

Dimensions of the Plots.

Each of the thirteen plots was 14 links in width and 3 chains in length. This allowed of three rows being sown 4 links apart, and a space of 6 links separating the adjoining rows of any two plots. Two buffer plots, 9 links wide, and accommodating two rows, were sown on each side.

The Seed.

The seed was cut to a uniform size for all plots, as far as possible, and to a good-sized set of about 2 oz. weight. Sets were cut the day previous to sowing, to allow the incision to heal, which was assisted with a sprinkling of air-slaked lime.

Planting.

The planting was done on 5th August, in a similar manner to the foregoing experiments, the sets being planted at a depth of 5 inches.

Applying the Fertiliser.

The fertiliser was scattered along the side of the furrow prior to planting by hand, as uniformly as possible, and in immediate contact with the sets.

The Germination.

The germination of this trial was satisfactory throughout.

After-treatment.

On 29th August, and a few days previous to the appearance of the young plants, the experiment was cross-harrowed. This destroyed a thick coating of young weeds. The cultivator was used on 11th and 23rd September and

7th October, and the plots were hilled with mould board attachments on the same implements on 14th October and 5th November.

Notes on Growth.

A very noticeable difference between manured and unmanured plots, in favour of the former, could be seen right up to maturity. As usual, the foliage of the plots containing a nitrogenous fertiliser, alone or in conjunction with others, was characterized by a deeper shade of green, in contrast with the light yellowy-green of the other plots.

The three outstanding plots all through were P4, Superphosphate and Sulphate of Ammonia, and Superphosphate and Sulphate of Potash, and the difference between the ultimate yield of potatoes in these three was small. Insect pests were very troublesome, and an application of arsenate of lead was made on 17th October, which proved beneficial.

Harvesting.

Harvesting took place on 25th November. A length of 14 links was dug off each end of each plot, and the remainder, which represented $\frac{1}{25}$ acre per plot, ploughed out and used for estimating the yield.

Results.

The results are shown in Table V. The percentage yields in order of merit are as follows:—

1.	Superphosphate and Sulphate of Ammonia	137 0
2.	Superphosphate and Sulphate of Potash...	136 3
3.	Superphosphate, Sulphate of Potash, and Sulphate of Ammonia (P4)	133·1
4.	Sulphate of Ammonia	110·1
5.	Sulphate of Potash	108·3
6	Superphosphate	106 5
7.	Superphosphate and Sulphate of Potash (P5)	104 8
8.	Superphosphate, Bone-dust, and Sulphate of Potash (P6)	100·1
9.	No manure...	100·0

Comments.

The adverse nature of the season, particularly the unsatisfactory distribution of the rainfall and the serious depredations of insect pests, were responsible for the low yields obtained from this experiment. This was also augmented by injudicious rotation—that is, the growing of two crops of potatoes running—on soil which is, comparatively speaking, old farming land. The value of manuring is, however, sufficiently demonstrated to warrant the application of a complete fertiliser for potatoes, on similar soils, in this district. For this purpose P4, a mixture of

13 cwt.	... .	Superphosphate
4 „	... ...	Sulphate of Ammonia
3 „	... ...	Sulphate of Potash

is to be recommended, applied at the rate of 4 cwt per acre.

The results seem to indicate that the elimination of either a potassic, phosphatic, or nitrogenous fertiliser is not desirable.

Table IV.

Showing arrangements of Plots in Experiment No. IV.

POTATO MANURIAL TRIAL.

Length of plots, 3 chains; width of plots, 14 links; area harvested, $\frac{1}{25}$ acre.

No. of Plot.	Quantity of Manure.	Supplying per acre— P₂O₅	K₂O	N
		P_2O_5	K_2O	N
...	BUFFER PLOT	...	...	...
		lb.	lb.	lb.
1	*Check*—no manure	...	...	...
2	Superphosphate, 291 lb.	49·4	...	...
3	Sulphate of Potash, 67 lb.	...	34·9	...
4	*Check*—no manure	...	...	...
5	Sulphate of Ammonia, 90 lb.	...	...	18·0
6	Superphosphate, 291 lb.; Sulphate of Potash, 67 lb. .	49·4	34·9	...
7	*Check*—no manure	...	...	...
8	Superphosphate, 291 lb.; Sulphate of Ammonia, 90 lb.	49·4	...	18·0
9	Superphosphate, 291 lb.; Sulphate of Ammonia, 90 lb.; Sulphate of Potash, 67 lb.	49·4	34·9	18·0
10	*Check*—no manure	.	..	...
11	Superphosphate, 291 lb; Sulphate of Potash, 112 lb.	49·4	58·2	...
12	Bone-dust, 219 lb.; Superphosphate, 73 lb.; Sulphate of Potash, 112 lb.	60·6	58·2	10·9
13	*Check*—no manure	...	...	...
...	BUFFER PLOT	...	...	..

The amounts of fertiliser are calculated from the following guarantee:—

(1) Superphosphate—17 per cent. phosphoric acid.
(2) Sulphate of potash—52 per cent. potash.
(3) Sulphate of ammonia—20 per cent. nitrogen.
(4) Bone-dust—22 per cent. phosphoric acid, 5 per cent. nitrogen.

TABLE V.—Showing Results of Experiment IV—Potato Manurial Trial.

No. of Plot.	Manure applied.	Yield per Plot.	Computed Yield per acre.				Percentage Yield.
		lb.	tons	cwt.	qrs.	lb.	
1 (*check*)	No manure	156	1	14	3	8	100·0
2	Superphosphate	175	1	19	0	7	106·5
3	Sulphate of Potash	187	2	1	2	27	108·3
4 (*check*)	No manure	181	2	0	1	17	100·0
5	Sulphate of Ammonia	182	2	0	2	14	110·1
6	Superphosphate and Sulphate of Potash	204	2	5	2	4	136·3
7 (*check*)	No manure	134	1	9	3	18	100·0
8	Superphosphate and Sulphate of Ammonia.	201	2	4	3	13	137·0
9	Superphosphate, Sulphate of Ammonia, and Sulphate of Potash.	212	2	7	1	8	133·1
10 (*check*)	No manure	172	1	18	1	16	100 0
11	Superphosphate and Sulphate of Potash	181	2	0	1	17	104·8
12	Bone-dust, Superphosphate, and Sulphate of Potash.	175	1	19	0	7	100·1
13 (*check*)	No manure	174	1	18	3	10	100 0

Summary.

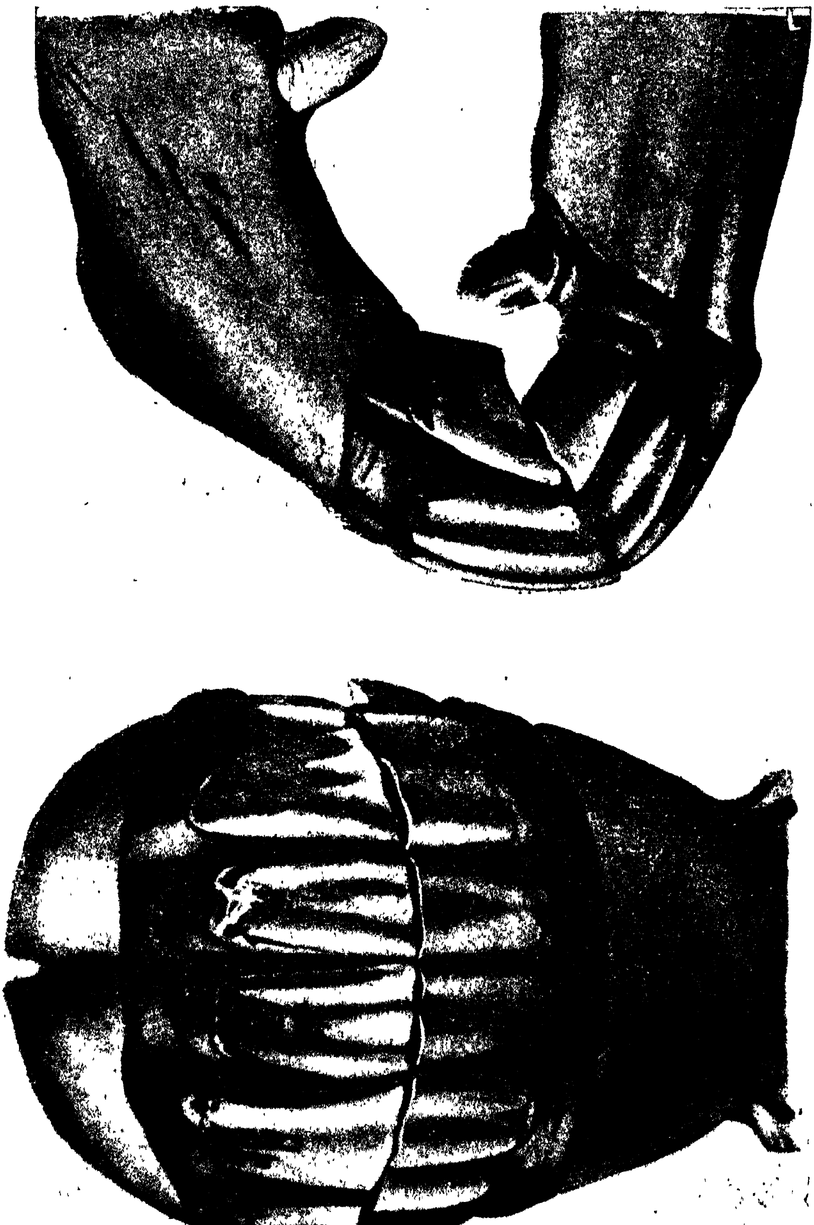
The conclusions to be drawn from the results of the foregoing experiments are that, other things being equal, the following conditions are the most suitable for potato culture in the Clarence River district :—

1. Variety—Manhattan.
2. Depth to plant—5 inches.
3. Size of "Set"—Large, well-sprouted tuber, 2 to 3 inches in diameter, cut into quarters, and
4. Artificial fertiliser, known departmentally as P4, applied at the rate of 4 cwt. per acre.

The Teeth of the Horse and its Age.

[Continued from page 47.]

Compiled by the Veterinary Officers of the Stock Branch under the authority of S. T. D. SYMONS, M.R.C.V.S., Chief Veterinary Officer.

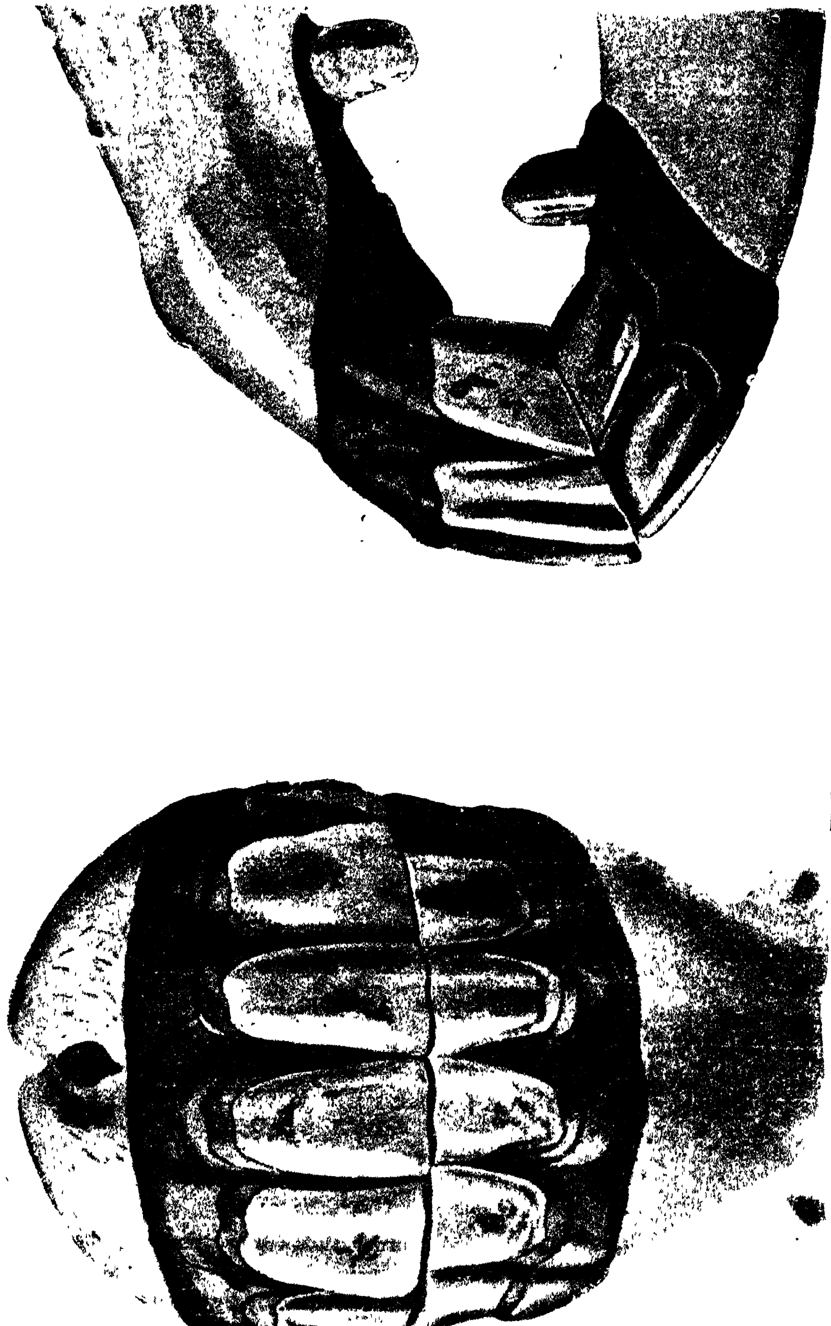


ELEVEN YEARS.

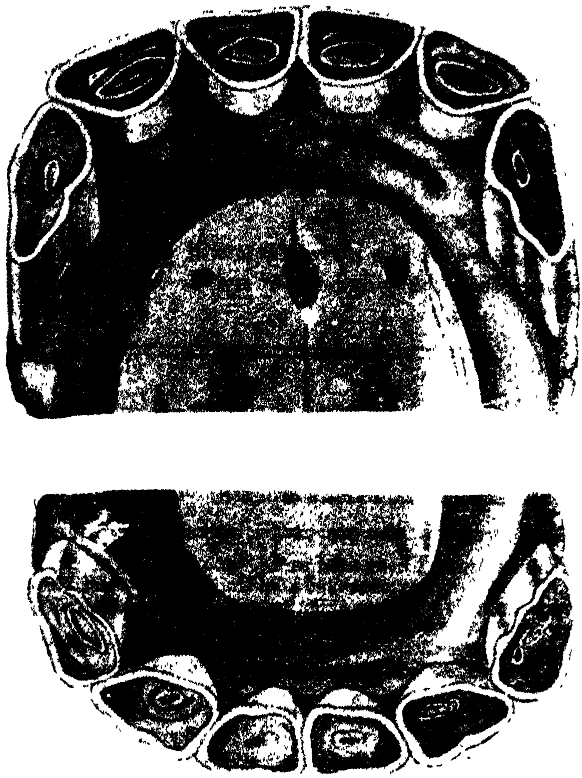
MOUTH AT ELEVEN YEARS.

[*After Goubaux and Barrier.*]

At 11 years: in profile the upper corner shows a greater obliquity than th intermediates; the inferior corner incisor is almost as wide at its free extremity as at its base which, besides, is cut squarely by the gum.



TWELVE YEARS.



MOUTH AT TWELVE YEARS.

[*After Goubaux and Barrier.*]

At 12 years: the obliquity of the superior corner is increased. It carries a notch behind, and the interspace which separates it from the lateral incisor is more marked. The tables of all the inferior incisors are now round.

After the age of 12 years the teeth become of less and less value as an indication of age, as much depends on the class of feed the horse is usually receiving and on individual peculiarities.

Certain changes are generally seen, and a rough estimate of the age can be made by careful note of these alterations.

The tables of the teeth tend to become more and more triangular, and instead of remaining wider from side to side than from before backwards, reverse this appearance.

Viewed from in front, the incisor teeth will be seen to become narrower towards the root and the spaces between them become more noticeable as age progresses.

Instead of remaining more or less perpendicular, as in the first ten years or so, the incisor teeth, especially in the lower jaw, gradually become more horizontal and the jaw itself takes on a thin and narrow appearance.

At times some indication of the age of the horse can be obtained from what is known as Galvayne's groove. This is seen on the outside of the corner incisor and commences at the top of the tooth at about 10 years, extends half way down the tooth at about 15, and goes right to the bottom at about 20 years of age.

Careful consideration of the above facts will give some guide up to 16 years, but beyond that the judgment of age is very difficult and largely guesswork.

The Use of Tobacco Wash.

Spraying with tobacco wash has been carried out with considerable success at the Glen Innes Experiment Farm's orchard.

Mr. W. Le Gay Brereton, the orchardist, reported as follows:—

It is the best Summer spray I have used so far, for either peach or woolly aphis It requires to be applied at a high pressure, and, as the leaves protect the aphis, the work has to be done very carefully. Where thick patches of aphis occur they must be blown off with the spray, or the under ones are unharmed.

This means giving the trees a thorough drenching, and runs away with a lot of spray, but this cannot be avoided, as light sprayings are useless where aphis are thick.

The method of making the wash is thus described:—

The materials required are:

100 lb. tobacco stalks.
300 gallons water.
3 lb. washing soda.

To prepare this tobacco wash weigh 100 lb. of tobacco stalks, and put them into an iron tank or boiler capable of holding 200 gallons of water. Press the stalks well down, and place on top well weighted boards to prevent the stalks from rising above the water. Sufficient water is then added to cover the stalks and to keep them covered while boiling. It is quite safe to use hard water for making this spray. The 3 lb. of washing soda is next added and allowed to dissolve.

The tank should be closed down and a large fire made under it. The fire should be kept burning until the water in the tank comes to a boil, when it can be allowed to die out. The tobacco stalks should remain soaking in the tank for twenty-four hours, and can then be removed. As the stalks will be found to hold a large quantity of the wash, it will be found advisable to drain them This can be done by placing them on corrugated iron roofing fixed in a slanting direction towards the tank, and the lower end resting on the tank itself. A piece of roof guttering can also be fixed to catch the wash draining down the iron and arranged to carry the wash back to the tank.

When this draining is complete the wash in the tank is measured. This is done by standing a piece of board upright in the tank, and marking the level of the wash on the board. The height of the wash is measured on the board and divided into thirds. One-third of it is taken and put into the spray cask, and enough water added to make up 100 gallons of spray in the cask. Repeating this with the remaining two-thirds of wash, a complete spray of 300 gallons is obtained.

It is not advisable to keep this tobacco wash for any length of time before using—certainly not longer than eight or ten days.

A Descriptive Catalogue of the Scale Insects ("Coccidae") of Australia.

[Continued from page 136.]

WALTER W. FROGGATT, F.L.S., Government Entomologist.

Aspidiotus destructor, Signoret.

Ann. Soc. Ent., *France* (4), vol. ix, p. 120. 1869.
Maskell, *Trans. New Zealand Institute*, vol xxiv, p. 12. 1891.
Cockerell, *Bull. No.* 6, *Tech. Series*, *U.S. Dep. Agr.*, p. 29. 1897.
A transparens, Green. *Insect Pests of Tea Plant*, p. 20. 1890.
A fallax, Cockerell. *Journal Inst Jamaica*, vol. 1, p. 225 1893.
A. cocotis, Newstead. *Entomologists' Monthly Magazine*, vol. xxix, p. 186. 1893

This is a tropical species, ranging from China and India, through the islands in the Indian Ocean, the West Indies, Mexico, and Demerara. It has of late years appeared in some of the Pacific Islands, and is a very serious pest on the banana plantations in Fiji, and has been recorded in Australia on fruit imported from these islands. It is found upon various palms, mango, nutmeg, and other plants.

The female puparium, white when fresh, but when scattered or single often yellowish white upon the banana fruits, circular, flat, with large central yellow pellicle. Under $\frac{1}{20}$ inch in diameter.

Adult female with three pairs of small median lobes, and a fourth pair sometimes definable and scale-like plates; the tips of median lobes not beyond second pair. Cockerell says, "Distinguished from *Aspidiotus neri*, to which it is closely allied, by the larger exuviæ and the short median lobes not extending beyond the tips of the second lobes."

1219. *Aspidiotus destructor.* Cat. Coccidæ, p. 257.

Aspidiotus dryandræ. Fuller.

Journal, Bureau Agr. W.A., vol. iv, No 17, p 1311 1897.
Trans. Ent. Soc London, p 465 1899.

This species was described from specimens obtained on the foliage of a native shrub (*Dryandra floribunda*) at Swan River, near Perth, W.A.

The female puparium is sub-circular, diameter 0·12 inch. Adult female having six lobes at tip of abdomen with spines, anal plates and spinnerets absent.

1221. *Aspidiotus dryandræ.* Cat. Coccidæ, p. 258.

Aspidiotus extensus. Maskell.

Trans. New Zealand Institute, vol. xxxvii, p. 41, pl. 1, figs. 4-5. 1894.

This coccid is found upon the foliage and twigs of a gum tree (*Eucalyptus capitellata*) from Victoria, and also from Bankstown, near Sydney, N.S.W.

The female puparium is about $\frac{1}{12}$ inch in diameter. Slate colour, but covered with a thin secretion, thickest at the base, giving it a dull brown tint. Sub-circular, convex, somewhat conical, finely striated; pellicles black, the first very large.

Adult female dark brown turbinate, abdomen terminating in two median lobes very close together; outer margins finely serrate; outer edges of abdomen irregular; no spinnerets.

1225. *Aspidiotus extensus.* Cat. Coccidæ, p. 258.

Aspidiotus (Targionia) eucalypti, Maskell.

Trans. Roy. Society S. Aust., 1887-88, p. 102, pl. xi, figs 1-2.
Trans. New Zealand Institute, vol. xxiv, p. 11, 1891 and vol. xxv, p. 206. 1892.

This species was described from South Australia upon the foliage of a gum tree (*Eucalyptus sp.*) Other specimens were recorded upon a she-oak (*Casuarina sp.*) from New South Wales.

Female puparium circular, slightly convex, dull white; diameter $\frac{1}{12}$ inch. Pellicles in centre small. Male puparium white, pellicle yellow, not carinated. Male and female scales thickly massed together on the bark.

Adult female with a deep transverse groove, about half the distance from cephalic extremity, which it divides into two irregular portions. Abdomen terminating in two median lobes at each side with short fine hairs; no groups of spinnerets, but rows along three last segments.

1331. *Targionia eucalypti.* Cat. Coccidæ, p. 297.

Aspidiotus fimbriatus, Maskell.

Trans. New Zealand Institute, vol. xxv, p. 208, pl. xi, figs. 4-6. 1892.

This species was described from specimens found upon a water gum (*Eugenia smithii*) near Sydney, N.S.W.

Female puparium circular, flat, thin, white, grey, or brownish. Diameter about $\frac{1}{18}$ inch; pellicles sub-central, yellow to greenish.

Adult female yellow, elongated, cephalic and abdominal portions separated by a ridge, latter terminating in six small lobes; margin of abdomen crenulated, fringed with broad scaly hairs; four groups of spinnerets, and ten to fourteen orifices.

Maskell placed this doubtfully in the genus Diaspis, and remarked upon the general appearance of the puparium being like that of *Diaspis rosæ*, but the adult female is a very distinct insect.

1227. *Aspidiotus fimbriatus.* Cat. Cocc[illegible], [illegible] 259.

Aspidiotus fodiens, Maskell.

Trans. New Zealand Institute, vol. xxiv, p. 10, pl. 1, figs. 3-4. 1891.

The specimens of this species were obtained upon a wattle (*Acacia sp.*) in Victoria, resting in depressions in the leaves, probably caused by their presence.

Female puparium circular, convex, grey to reddish brown. Diameter $\frac{1}{25}$ inch. Pellicles forming a bright orange boss in centre, but often obscured by a greyish secretion.

Adult female orange, abdomen somewhat acuminate, terminating in six rather narrow floriated lobes, rather close together, interspersed with very scaly serrate hairs. At a little distance from the margin is another lobule, denticulate on the sides. Spinnerets in four groups, also single ones.

1228. *Aspidiotus fodiens.* Cat. Coccidæ, p. 259.

Aspidiotus (*Chrysomphalus*) *ficus*, Ashmead. (Pl. 11, fig. 2.)

American Entomologist, vol. iii, p. 267. 1880.

Comstock, *Report U.S. Dep. Agriculture*, 1880, p. 296.

Cockerell, *Bull. No.* 6, *Tech S ries*, *U.S. D Agri.*, p. 29 1897.

This is a cosmopolitan species that has a very wide range over the world and is found on a great number of very different kinds of trees and plants. In Sydney it often comes into port with oranges from the Pacific Islands, and is found in gardens on palms. Tryon reports it in Queensland upon oranges, *Myrtus hillii*, camphor laurel, *Atlantia buxifolia*, and *Castanospermum australis*. It is the common scale in Cairo, Egypt, on oranges, where it seems to take the place of the red scale (*A. aurantii*). The female puparium is circular, about $\frac{1}{12}$ inch in diameter, very dark chocolate brown to almost black, with the large covered pellicles reddish orange. They are generally scattered over the surface of the oranges and not crowded together like red scale or the grasstree scale (*A. hederæ*), but upon the leaves of the palm are often very abundant. From its very circular form it is very often described as "The Round Scale." Adult female with three pair of well defined lobes at the tip of the abdomen and four groups of ventral glands. This species is placed under the name of *Aspidiotus aonidinm*, Linn., in Mrs. Fernald's catalogue; but, as it has been known and described for years under the name of *A. ficus*, it seems very foolish to alter the name, for there can be no certainty as to what species Linné's type *Coccus aonidium* can be defined. Linné's description, as given in Turton's Edition, 1806, p. 712, is as follows:—"On various evergreen trees of Asia. Body purplish black, crown tuberculate." Even Mr. Cockerell must admit that this description would cover all the dark-coloured forms of the genus.

1294. *Chrysomphalus aonidium.* Cat. Coccidæ, p. 286.

Aspidiotus gidgei, n.sp.

A western species found upon the foliage of the Gidgei (*Acacia cambagei*) at Pera Bore, Darling River, New South Wales.

Female puparium almost circular, very convex. Diameter, $\frac{1}{35}$ inch. Outer surface greyish brown, but when the secretion peels off it is almost white. Pellicles light yellow, circular, and sometimes slightly depressed in the centre.

Female coccid dull yellow, darkest on the outer edges, almost circular, slightly on the sides above the pygidium, anal segment with two broad rounded lobes fringed with hair on either side.

Aspidiotus hakeæ, Maskell.

Trans. N. Zealand Institute, vol xxviii, p. 383, pl. xxviii, figs. 1–6. 1896.

This species was described from specimens obtained upon a needlebush (*Hakea sp.*) near Sydney, N.S.W.

Female puparium circular, slightly convex; greyish white; diameter, $\frac{1}{16}$ inch, but rather variable. The outer secretion when rubbed off exposes the dark orange pellicles in the centre. Puparium of male very much smaller, circular, and much whiter than female.

Maskell says: "This species may be recognised by the entire absence of abdominal lobes in the adult female, and their presence conspicuously in the pellicles, also by groups of rostral spinnerets in the first pellicle, and the large oval ones in the male pupa."

1231. *Aspidiotus hakeæ.* Cat. Coccidæ, p. 260.

Aspidiotus hartii, Cockerell.

Psyche, v. vii, Suppl. 1, p. 7. 1895.
Bull. No. 6, *Tech. Series*, *U.S. Dep. Agri.*, 1897, p. 24.

This species was described upon the tubers of yams grown in Trinidad, W.I., but probably has a wide range. A great number of the large yams brought into Sydney from the New Hebrides and other Pacific Islands are often thickly encrusted with these white or dull brownish grey scales in all stages of development.

The female puparium agrees in all particulars with Cockerell's definition: "Sub-circular to oval, about $1\frac{1}{2}$ mm. diameter, moderately convex, dull brownish grey with a slight purplish tint, exuviæ shining pale straw colour. Female with two pairs of well developed lobes, branched plates, four groups of ventral glands."

1232. *Aspidiotus hartii.* Cat. Coccidæ, p. 260.

Aspidiotus hederæ, Vallot. (Pl. II, fig. 1.)

Chermes hederæ, *Mémoires d' l'Académie des Sciences*, Dijon, p. 30. 1829.
Aspidiotus nerii, Bouché, Schädl., *Gart. Insects*, p 52. 1833.
,, *palmarum*, Burmeister, *Handl. Ent.*, vol. ii, p. 69. 1835.
,, *limoni*, Signoret, *Ann. Soc. Ent.*, *France* (4), vol. ix, p. 125. 1869.

This cosmopolitan species not only has a world-wide range, but infests all kinds of plants, shrubs, and forest trees of dissimilar orders. It has received so much notice and so many different names that it occupies four pages in Mrs. Fernald's catalogue.

It is found all over Australia, even in our Western scrubs, smothering the foliage; about Sydney on *Macrozamia sp.*, Mangrove, *Eugenia smithii*, and Laurel; in the Western scrubs on *Eremophila mitchelli*, *Heterodendron oleæfolium*, *Platylobium*, and other trees. Maskell records it upon Oleander, Citrus, and Acacia from all our States, and though I have never seen it in an orchard, many lemons coming from Italy and Tripoli into our port are often covered with these scales.

Adult female puparium usually white, but it varies widely both in colour and texture upon different food plants, and varies from brownish to pale straw-colour on lemons; sometimes thin and almost transparent, even at times with a green tint. General form circular or ovate, flat or converse; pell cl s, central yellow; diameter, $\frac{1}{12}$ inch.

Adult female yellow, pyriform, with the pair of lobes at tip of abdomen, the median pair well developed and rather widely separated, spines distinct, anal aperture large, spinnerets short; pores forming a broad irregular band along the whole length of the pygidium.

Male puparium white, very variable in form, pale yellow to orange

1233. *Aspidiotus hederæ.* Cat. Coccidæ, p. 260.

Aspidiotus (Hæmiberlesia) immaculatus, Green.

Victorian Naturalist, vol. xxi, p. 65, fig. 1. 1904.

This species was described from Shepparton, Victoria, on the foliage of *Styphelia virgata*.

Adult female puparium snowy white, convex, the apex tilted over towards the anterior extremity; diameter, $\frac{1}{25}$ to $\frac{1}{50}$ inch; pellicles hidden by white secretion, but indicated by a regular disc.

Adult female broad, pyriform; pygidium blunt, lobes small, hidden from above by the margin of the abdomen; circumgenital glands wanting; dorsal pores inconspicuous; anal aperture rather large.

Aspidiotus junctilobius, n.sp. (Pl. II, fig. 3.)

This species was found on the twigs and leaves of the Yarran (*Exocarpus aphylla*), growing at Whitton, in the south-west of New South Wales.

Female puparium circular but somewhat irregular in form, as they are often clustered together on the nodes on the stalks in bunches of half a dozen or more, white to light brown, convex; about $\frac{1}{30}$ inch in diameter; pellicles large, brown, often obscured with white secretion, usually central, but a few with the pellicles quite on the side. In the immature female scales the pellicles are dull yellow.

Adult female brownish, with the tip of abdomen reddish-brown, rather elongate, with distinct constriction between the cephalic and abdominal segments; turbinate to extremity.

Aspidiotus kennedyæ, Boisduval.

Chermes kennedyæ, *Ent. Hort*, p. 326. 1867.
Signoret, *Ann. Soc. Ent France* (4), vol ix, p. 124. 1869.
Cockerell, *Bull. No. 6*, *Tech. Series*, *U.S. Dep. Agr.*, p. 29. 1897.

This species was described from Australia on a species of *Kennedya*, and is a form allied to *Aspidiotus neri*, according to Cockerell.

Aspidiotus myoporii, Lydgett.

The Wombat, vol. iv, p. 14. 1898.

This is a species described through a misprint as *Aspidiotus yoporii*, but was taken upon the foliage of *Myoporium deserti* at Myrniong, Victoria.

Lydgett describes the female puparium as circular, slightly convex, with yellowish pellicles forming a slight depression; average diameter $\frac{1}{12}$ inch. It varies in colour from dark brown to almost black. The male puparium smaller and more elongated. Adult female turbinate, abdomen with six lobes and spinnerets; dark brown.

1246. *Aspidiotus myoporii.* Cat. Coccidæ, p. 267.

Aspidiotus niveus, Fuller.

Trans. Ent. Soc., London, p. 465. 1899.

A species described from near Perth, Western Australia, upon *Acacia pulchella.* It is closely allied to *Aspidiotus ceratus* (Mask.), but differs in the form of the lobes, and in the absence of the widely forked spines.

Fuller says, "Female puparium circular, very convex, pure white, pellicles light yellow, central one often hidden by the secretion of first stage; diameter, 0·04 inches. Male scale, smaller white, pellicle yellow."

1248. *Aspidiotus niveus.* Cat. Coccidæ, p. 268.

Aspidiotus perniciosus, Comstock.

Report U.S. Dep. Agriculture, 1880, p. 304.
Olliff, *Agri. Gazette, N.S. Wales*, vol. iii, pp. 698-89. 1892.
Froggatt, ,, ,, vol. viii, p. 874 1897.
Aonidia fusca (Maskell), *Trans. N. Zealand Institute*, vol. xxvii, p. 43, pl. 1, figs. 6-8. 1894.

This cosmopolitan species is a common orchard scale, popularly called the "San José" scale because it was first recorded as a serious orchard pest in the neighbourhood of that Californian town. Comstock, when he gave it the specific name of *perniciosus*, stated that he had never seen any scale doing so much damage or so thickly encrusting the surface of the plants infested as this species, which was described from Florida.

As regards the range and number of different plants infested, readers are referred to Mrs. Fernald's catalogue.

In Australia it has been and still is a serious pest to peach, cherry, and plum trees, but is also common on apple and pear trees in many districts upon the bark, foliage, and fruit. It is essentially a nursery pest, and has been spread all over the Australian States with nursery stocks. It has been found on other plants and shrubs, but in most cases can be traced from fruit orchards. In the case of the species that Maskell described under the name of *fusca*, upon Eucalypts from South Australia and Victoria, it may also have been carried from infested orchard trees. This scale has been studied in all parts of the world, but though its original home is a matter of doubt, it is supposed to have come with nursery stock from Japan and China, and certainly it was introduced on several occasions into New South Wales with plants from Japan.

The adult female forms a blackish puparium, with a deep reddish-yellow centre (the pellicle), and is very firmly attached to the bark or skin of the fruit, and when removed leaves a bright red ring imprinted round their scale, by which they are easily recognised upon an infested tree, and badly

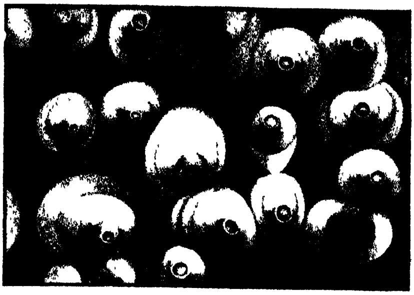


Fig. 1 *Aspidiotus hederae*, Vallot.

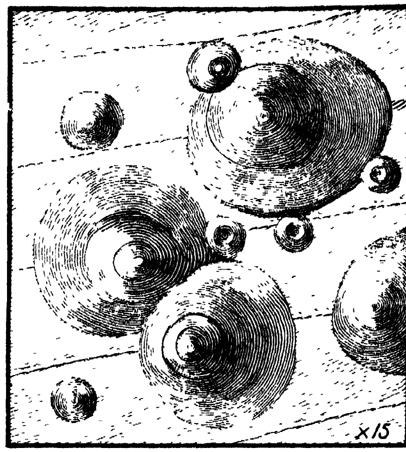


Fig. 4 *Aspidiotus subrubescens*, Maskell.

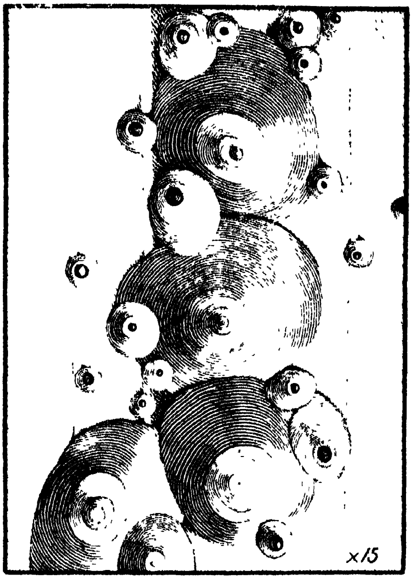


Fig. 2 *Aspidiotus acus*, Ashmead.

Fig. 5.—*Aspidiotus rubribullata*, n.sp.

Fig. 3.—*Aspidiotus punctulobius*, n.sp.

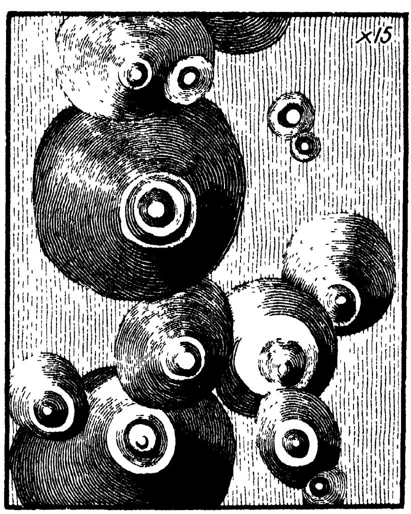


Fig. 6.—*Aspidiotus rossi*, Maskell.

SCALE INSECTS OF AUSTRALIA. Plate II.

infested fruit becomes all spotted and blotched. They are often so thickly encrusted over the bark as to form a regular scurfy skin, while the bark beneath becomes cracked and gums, large branches often dying back, and a young tree, infested before it leaves the nursery, never recovers or grows up when planted out in an orchard.

1256. *Aspidiotus perniciosus.* Cat. Coccidæ, p. 271.

Aspidiotus (*Chrysomphalus*) *rossi*, Maskell. (Pl. II, fig. 6.)

Trans. N. Zealand Institute, vol. xxiii, p. 3, 1890; vol. xxiv, p. 11, 1891; vol. xxv, p. 207, 1892; vol. xxix, p. 296, 1897; and vol. xxx, p. 244, 1898.

Green, *Coccidæ of Ceylon*, pt. 1, p. 45 1896.

This is such a common species in Australia, that though it has also been recorded from a number of other places such as New Zealand, China, Japan, Ceylon, and Africa, it is very probable that this country is its native home. Common all along the coast upon the foliage of the grass trees (*Xanthorrhœa*), the slender grass-like leaves often thickly encrusted with the round black scales. It is found on a number of very dissimilar shrubs and plants in the forest—upon *Capparis*, *Rhinocarpus*, *Araucaria*, *Banksia*, &c. It has spread on to Olive trees, Oleanders, Palms, Arbutilon, and Euonymus in our gardens and parks. On different plants it varies much in both size and colour, and the specimens found upon *Banksia serrata*, our common coast honeysuckle, are sometimes coated with a regular white secretion like enamel, through which the true black shell shows out as it scales off.

The action of this scale is also different on various host plants. Tepper records it in South Australia upon Coccoboba, Hyssop, and Artemisia, without damage to the plants, but even a few injure, and a quantity kill, Arbutilons.

Cockerell has described a variety, under the name of *Victoriæ*, found on the blue gum (*Eucalyptus globulus*), in the *Victorian Naturalist* (vol. xvi, p 89, 1889). Female puparium irregularly rounded, varying considerably both in shape and size on different food plants, dark brownish red to black, with a central ring, the pellicles forming a boss in the centre; white at apex. Diameter up to $\frac{1}{10}$ inch.

Adult female pyriform, terminal segment coming to a point, margins flattened; six prominent lobes, beyond which are seven projecting spine-like processes, forming a regular serration. Brownish yellow; length, 1·50 mm.

1113. *Chrysomphalus rossi.* Cat. Coccidæ, p. 293.

Aspidiotus (*Aspidiella*) *rubribullata*, n.sp. (Pl. II, fig. 5.)

This species comes from near Perth, W.A., where it was found clustering thickly upon the stems of an undetermined species of Eucalyptus. I have also obtained it upon the stems of another Eucalypt at Trangie, N.S.W.

Female puparium circular, convex, chocolate brown, pellicles large, forming a regular boss in the centre, deep orange red, sometimes clouded with white secretion. Diameter up to $\frac{1}{20}$ inch.

Adult female dull yellow, almost circular, the pygidium projection beyond, and sharply contracted at the junction with the outer margin of the

abdomen. Pygidium with two rounded lobes in the centre, and a second one either side deeply arcuate on the outer margin, with smaller indistinct lobes further round, furrowed with six parallel furrows, giving it a very serrate appearance on the outer margin. The whole thickened and chitonous, but covered with very fine parallel striæ.

Aspidiotus serrata, n.sp.

Covering the surface of the leaves of the Gidgei (*Acacia cambagei*), growing at Pera Bore, Darling River, New South Wales, Female puparium almost circular, very convex. Diameter $\frac{1}{35}$ inch. Outer surface greyish brown, inner surface white; pellicles light yellow, central sometimes slightly depressed at apex. Adult female dull yellow, darkest on the outer edges, almost circular, slightly constricted on the upper edge of pygidium, with two broad rounded lobes fringed with pairs on either side, giving it a fine serrate appearance. Anal aperture large.

Aspidiotus simillimus, Cockerell.

A. transparens, subsp. *simillimus*, Green, *Ann. Mag. N. H.* ser. 7, vol. 11, p. 27. 1898. *A. simillimus*. 1902.

This species was described upon a palm from Australia, condemned by the Quarantine officer at San Francisco.

It is closely allied to *A. destructor* in form of puparium, and differs from *A. neri* in having a large light yellow central pellicle. Adult female with three well developed lobes, median one lightly notched on inner and outer side, second lobe narrow, third lobe smaller, notched on outer side, squames extending beyond tips of lobes. Caudal region striated. Four groups of circumgenital glands Differs from *A. destructor* in the longer median lobes, and more numerous glands in circumgenital groups, and also longer squames.

Aspidiotus (*Targionia*) *subfervens*, Green

Victorian Naturalist, vol. xxi, p. 66. 1904.

This species was collected in the south of Victoria, upon an Acacia, and also upon a species of Pomaderris. The female puparium circular convex, blackish brown, more or less clouded with white secretion. Pellicles fulvus also clouded. Below deep chocolate brown, and the pellicles deep red.

"Adult female almost circular. Pygidium rather acutely pointed. Median pygidial lobes large, prominent, convergent." Lateral lobes small, spines moderately large. No circumgenital glands. Dorsal pores few. Length 1 to 1·10 mm. Green also says pygidial characters are very similar to those of *Aspidiotus perniciosus* (San José Scale) and points out the differences.

Aspidiotus subrubescens, Maskell. (Pl. II, fig. 4.)

Trans. N. Zealand Institute, vol. xxiv, p. 9, pl. 1, figs. 1-2, and vol. xxv, p. 207. 1892.

Cockerell, *Bull. No. 6. Tech. Series U.S. Dep. Agr.* p. 27. 1897.

This species was described from specimens obtained in Victoria upon a Eucalyptus, from Sydney upon a Banksia, and again from Victoria on

Tristania conferta growing near Bright; Pittosporum (Cockerell) from Australia. The female puparium sub-circular, flattened, dull to reddish brown, pellicles central, sometimes forming an elevated boss, in others depressed, diameter $\frac{1}{12}$ inch. Adult female with six lobes and serrated plates, four groups of ventral glands. Maskell says it is a very inconspicuous-looking scale upon the leaves of Eucalypts, that might be easily passed over as a rusty spot or discoloration. Green has described a variety under the name of var. *corticoides* on the stems of the blue gum (*Eucalyptus globulus*) from Victoria in the *Victorian Naturalist*, p. 3, 1905.

1266. *Aspidiotus subrubescens.* Cat. Coccidæ, p. 279.

Aspidiotus unilobis, Maskell.

Trans. N. Zealand Institute, vol xxvii, p. 40, pl. 1, f 3. 1894
Newstead, *Entomologists' Monthly Magazine*, vol. xxi, p 234. 1895.

This species was found upon a species of Acacia at Mount Victoria, Blue Mountains, N.S.W.

The female puparium whitish, but the types were so discoloured with fumagine as to be almost black. Circular, slightly convex Pellicles orange, central, forming a minute boss. Diameter $\frac{1}{20}$ inch. The much smaller non-carinated male scale, elongated white. Adult female dark orange, turbinate, abdomen terminating in a single rounded median lobe, fringed on either side with fine hairs; margins finely striated and crenulated. Length about $\frac{1}{30}$ inch.

1271. *Aspidiotus unilobis* Cat. Coccidæ, p. 280.

Aspidiotus virescens, Maskell.

Trans N. Zealand Institute, vol. xxviii, p. 384, pl. xviii, figs 7-10. 1896.
Cockerell, *Bull. No. 6 Tech. Series, U S. Dep. Agri.*, p. 27 1897.

The type specimens were collected near Sydney, N.S.W., upon the foliage of the water gum (*Eugenia smithii*)

The female puparium sub-circular flat, pure white, very thin and delicate in texture. Pellicles sub-central green. Diameter $\frac{1}{20}$ inch. Adult female turbinate yellowish green. Abdomen with six sub-equal lobes with numerous broad scaly hairs between them, which fringe nearly the whole of the abdominal margins. Four groups of spinnerets, with other tubular ones on the dorsal surface.

Maskell says: This species may be distinguished by the terminal lobes and scaly hairs, as well as the papery, thin puparia, and the distinctly green pellicles.

1274. *Aspidiotus virescens.* Cat. Coccidæ, p. 280.

(To be continued.)

Annual Reports of Demonstration Areas, 1912-13.

GRAFTON EXPERIMENT FARM.

A. H. HAYWOOD, Manager.

THE Demonstration Area at this Farm consists of one block of 63½ acres on the eastern boundary of the Farm, abutting on Alumny Creek.

It is good second-class land, valued at £30 per acre, and consists of a clay loam with a clay subsoil at an average depth of 2 feet from the surface.

The system of cropping worked out and practised on this area is mainly with a view to conserving the natural fertility of the soil by a rotation of crops suited to the district, and also to demonstrate that these crops can be fitted in with commercial farming.

The rotation practised was as follows:—

Wheat, sown in June and harvested in October.
Cowpeas, sown in November and harvested in March.
Potatoes, planted in July and harvested in November.
Maize, planted in December and harvested in June.

This is a double cropping system, and it is thus possible to get four crops off the same land in two years.

The rainfall totalled 39 inches 84½ points, and was distributed as under:—

1912.	Points.	1913.	Points.
July	459	January	224½
August	87	February ...	470½
September ...	66½	March	112
October	242	April	531
November ...	599	May	551
December ...	97	June	545

This was a normal year's fall, as a whole, but the greater proportion fell during the latter part of the year and the earlier crops did not benefit. The potato crop was light, but prices were abnormally high and compensated for the low yield.

It will be seen that a substantial profit is shown for the Demonstration Area for the year's working.

At actual farm costs the profit (including valuation of standing crop of maize) is £4 13s. 4d. per acre. Calculated at district farm rates the profits amounted to £5 9s. 5d. per acre, with the additional estimated profit to be derived from the standing crop of maize as on 30th June, 1913.

The following are the actual costs charged to the Demonstration Area in the Farm's books, whereas the succeeding tables give local rates for all operations:—

PROFIT AND LOSS ACCOUNT.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
To Rental value, 30s. per acre	95	5	0	By Returns from crops ...	1,039	3	1
Wages and salaries ...	282	17	5				
Apprentice labour ...	2	2	0				
Horse cost	53	4	0				
Seeds, bags, stores, &c. ...	263	15	3				
Hire, machinery, and supplies from other farm branches...	45	8	9				
Profit	296	10	8				
	£1,039	3	1		£1,039	3	1

Demonstration Area.—63½ Acres.

Statement showing individual Crop Accounts.

Area.	Crop.	Variety.	Remarks.
Acres.			
(1) 30 ...	Maize	Early Leaming ...	Cowpeas and maize (Dent) were sown on the land previously occupied by wheat and potatoes. The cowpea crop was complete and reaped by end of year, but Dent maize was standing, not fit to pull.
(2) 26 ...	Potatoes ...	Satisfaction and Up-to-Date.	
(3) 3 ...	Wheat for hay...	Thew	
*(4) 3½ ...	Cowpeas ...	Black	
*(5) 26¾ ...	Maize	Improved Yellow Dent.	

* Double crop.

No. 1.—Maize for Grain, 30 acres. Variety, Early Leaming.

Dr.

	£	s.	d.
First ploughing, double-furrow disc, at 7s. 6d. per acre ...	11	5	0
,, rolling, at 9d. per acre ...	1	2	6
Second ploughing, double-furrow disc, at 7s. 6d. per acre ..	11	5	0
First harrowing, disc, at 9d. per acre ...	1	2	6
Second ,, tine, at 9d. ,, ...	1	2	6
,, rolling, at 9d. per acre ...	1	2	6
Seed, 10 lb. per acre, at 7s. 6d. per bushel ...	2	0	2
Planting with corn planter, at 1s. 6d. per acre ...	2	5	0
Scuffling with tine scuffle, at 1s. 4d. ,, ...	2	0	0
Hilling with disc hiller, at 1s. 7d. ,, ...	2	7	6
Pulled and threshed with power machine, at 13s. per acre	19	10	0
Bags for proportion sold, 18 doz. at 7s. ...	6	6	0
Cartage to wharf of proportion sold, *i.e.*, 864 bushels, at 1d. per bushel ...	3	12	0
Chopping down stalks (chopping roller) and cleaning up, at 1s. 7d. per acre ...	2	7	6
Rent of 30 acres land, 12 months, at 30s. per acre... ...	45	0	0
Balance ...	109	5	8
	£221	13	10

Cr.

		£	s.	d.
1,255	bushels grain harvested, equivalent to 42 bushels per acre, and disposed of as under :—			
856	bushels, sold in Sydney markets at various rates, for a *net* return of ...	159	11	10
389	bushels, used for horses, pigs, and poultry on farm, and charged out at 3s per bushel	58	7	0
10	bushels, sold as seed maize, at 7s. 6d. per bushel	3	15	0
1,255				
		£221	13	10

No. 2.—Potatoes, 26 acres. Varieties, Satisfaction and Up-to-Date.

Dr.

	£	s.	d.
First ploughing, single furrow, 8s. per acre ...	10	8	0
,, rolling, at 9d. per acre ...	0	19	6
,, harrowing, tine, at 9d. per acre ...	0	19	6
Second rolling, at 9d. per acre...	0	19	6
Seed, 9 cwt. to acre, at £11 per ton, landed at Farm ...	128	14	0
Cutting seed, at 10s. 6d. per acre ...	13	13	0
Ploughing in potatoes, double and single furrow ploughs, at 7s. per acre ...	9	2	0
Dropping potatoes, at 3s. 4d. per acre ...	4	6	8
Second harrowing, at 9d. per acre ...	0	19	6
Third do at 9d. ,, ...	0	19	6
Twice scuffled, double cultivator, at 1s. 9d per acre ...	4	11	0
Sprayed twice, 5-row sprayer, at 5s. per acre ...	13	0	0
Hilling, single plough, at 2s. 4d. per acre ...	3	0	8
Ploughing out, picking up, and bagging 620 bags, at 1s. per bag ...	31	0	0
Bags, 50 doz. (some used twice on farm), at per 7s. 6d. doz.	18	15	0
Cartage to wharf (553 bags sold), at 3d. per bag ..	6	18	3
Harrowing tops and levelling ground, at 9d. per acre ...	0	19	6
Rent of land for 6 months, at £1 10s. per acre per annum..	19	10	0
Balance ...	210	15	9
	£479	11	4

Cr.

	£	s.	d.
52 tons 1 cwt. 1 qr., all grades potatoes, equivalent to a return of 2 tons per acre in round figures, and disposed of as follows :—			
555 bags, weighing 45 tons 0 cwt. 2 qrs., sold (550 Sydney, 5 locally) at prices ranging from £22 to £7 per ton, for a *net* cash return of ...	449	15	10
Consumption in quarters, 2 cwt. ...	0	10	0
Reserved for seed for Autumn crop, 2 tons 16 cwt. 3 qrs., at £10 per ton ...	23	7	6
Small and waste potatoes fed to pigs, 3 tons 12 cwt., at 5s. per ton ...	0	18	0
	£479	11	4

Special Note.—The season was dry, the yield small, and prices abnormally high for potatoes in Sydney market.

Dr. No. 3.—Wheat for Hay, 3 acres. Variety, Thew. *Cr.*

	£	s.	d.		£	s.	d.
Ploughing, single furrow, at 8s. per acre	1	4	0	Yield, 5 tons hay ($1\frac{2}{3}$ tons per acre), used on farm, and valued at local district rate of £5 per ton	25	0	0
Harrowing, tine, 9d. per acre	0	2	3				
Seed, $1\frac{1}{2}$ bushels per acre, at 7s. 6d. per bushel	1	13	9				
Broadcasting, at 6d. per acre ...	0	1	6				
Harrowing in, at 9d. per acre	0	2	3				
Mowing, at 1s. 3d. per acre	0	3	9				
Making hay, loose (raking and cocking), at 3s. 3d. per acre	0	9	9				
Carting to shed, 5 tons, at 3s. 6d. per ton	0	17	6				
Rent of land, 6 months, at 30s. per annum	2	5	0				
Balance	18	0	3				
	£25	0	0		£25	0	0

Note.—This crop immediately succeeded an autumn crop of potatoes. Planted late in June.

Dr. No. 4.—Cowpeas for Seed, $3\frac{1}{4}$ acres. Variety, Black. *Cr.*

	£	s.	d.		£	s.	d.
Ploughing, double furrow mould-board, at 5s. per acre ...	0	16	3	Yield 35 bushels of seed, equivalent to $10\frac{10}{13}$ bushels per acre, disposed of as follows:—			
Harrowing, tine, at 9d. per acre	0	2	6				
Rolling, at 9d. per acre	0	2	6	29 bushels transferred to other Departmental farms, at 12s. per bushel...	17	8	0
Planting (corn dropper), at 1s. 6d. per acre	0	4	11				
Seed, 8 lb. per acre, at 12s. per bushel, at 1s. 8d. per acre	0	5	5	4 bushels sold at 12s. per bushel	2	8	0
Scuffling, twice, at 1s. 3d. per acre each time	0	8	2				
Picking, hand, 35 bushels, at 3s. per bushel	5	5	0	2 bushels retained for seed at 12s. per bushel	1	4	0
Threshing and cleaning, 35 bushels, at 6d. per bushel ...	0	17	6				
Bags, 9 at 7s. 6d. per dozen	0	5	8				
Cartage to wharf, 1d. per bushel	0	2	11				
Steamer freight to Sydney, 1s. 3d. per bag	0	11	3				
Rent of land, 6 months, at 30s. per acre per annum ...	2	8	9				
Balance	9	9	2				
	£21	0	0		£21	0	0

Note.—This crop immediately succeeded the spring crop of potatoes.

No. 5.—Maize for Grain, 26¾ acres. Variety, Improved Yellow Dent.

Planted on ground previously occupied by spring crop of potatoes. At date of presentation of balance-sheet the crop was not fit to harvest and was valued as a standing crop only, consequently a statement of costs and profits cannot be given. A conservative estimate of yield was made at 40 bushels per acre.

SUMMARY of Crop Returns from Demonstration Area of 63½ acres for year ending 30th June, 1913, costs based on local district rates, and returns on ascertained actual selling or district rates.

Area.	Crop.	Variety.	Total Profit.	Profit per acre.
			£ s. d.	£ s. d.
30 acres	Maize	Early Leaming	109 5 8	3 12 10
26 ,,	Potatoes	Satisfaction and Up-to-Date.	210 15 9	8 2 1
3 ,,	Wheat (for hay) ..	Thew	18 0 3	6 0 1
*3¼ ,,	Cowpeas (for grain) ...	Black	9 9 2	2 18 2
*26¾ ,,	Maize	Improved Yellow Dent .	(Incomplete)	......

* Double crop. Land previously occupied by wheat and potatoes.

COWRA EXPERIMENT FARM.

M. H. REYNOLDS, Manager.

THE cost of production and receipts in the undermentioned return is based on the following table :—

Cost of Ploughing	6s per acre.
,, Cultivating	2s 6d. ,,
,, Harrowing	9d. ,,
,, Manure	3s. 3d. ,,
,, Seed	4s 6d, per bushel.
,, Pickling seed	3d. ,,
,, Drilling	1s. 6d. per acre.
,, Harrowing growing crop	1s. ,,
,, Thrashing and straw stacking	£1 0s. 6d. per acre.
,, Harvesting hay and stacking	12s 6d. ,,
,, Bags	6s. per dozen.
,, Rent	8s. per acre per annum.
,, Cartage of grain to rail	1d. per bushel.

Total area, 128 acres	Wheaten and oaten hay ...	40 acres.
	Wheat for grain	62 „
	Oats „	24 „
	Barley „	2 „

Dr.

	£	s.	d.
Ploughing, at 6s. per acre ...	38	8	0
Cultivating, at 2s. 6d. per acre	16	0	0
Harrowing, „ 9d. „ ...	4	16	0
Manure, „ 3s 3d. „ ...	20	16	0
Seed, at 4s. 6d. per bushel ...	21	12	0
Pickling seed, at 3d. per bushel	1	4	0
Drilling, at 1s. 6d. per acre ...	9	12	0
Harrowing growing crop, at 1s. per acre	6	8	0
Thrasher and straw stacking, at £1 0s. 6d. per acre ..	90	4	0
Hay cutting, carting and stacking, at 12s. 6d. per acre ...	25	0	0
Bags, 690, at 6s. per dozen ...	17	5	0
Rent, at 8s. per acre	51	4	0
Carting grain to rail, at 1d. per bushel	8	12	4
	£311	1	4
Profit	416	14	2
	£727	15	6

Cr.

	£	s.	d.
1,165 bushels wheat, at 3s. 6d.	203	17	6
834 „ oats, „ 3s. ...	125	2	0
69 „ barley „ 4s. ...	13	16	0
120 tons straw stacked, at 22s 6d.	135	0	0
100 tons hay, at 50s. per ton	250	0	0
	£727	15	6

Fodder Crops for Silage, total, 52 acres.	Sorghum	15 acres.
	Maize alone	15 „
	Maize and cowpeas ...	19 „
	Cowpeas alone	3 „

Dr.

	£	s.	d.
Ploughing, twice, at 6s. and 4s. per acre	26	0	0
Harrowing, twice, at 9d. per acre	3	18	0
Drilling, once	4	4	0
Seed, sorghum, 3 lb. per acre, 45 lb. at 4d.	0	15	0
Seed, maize, 8 lb. per acre, 120 lb., at 4s. per bushel (56 lb.)...	0	8	7
Seed, cowpeas, 10 lb. per acre, 66⅓ lb., at 15s. per bushel (60 lb.)	0	16	7
Superphosphate, 50 lb. per acre	7	3	0
Drilling, at 1s. 6d. per acre . .	3	18	0
Cultivating, twice, at 2s. 6d. per acre	13	0	0
Cost of harvesting for ensilage, cutting with binder, horses, and labour	4	8	0
Engine and cutter	1	3	0
Haulage	1	16	0
Labour, handling, and cutting	8	0	0
Rent of land for six months ...	10	8	0
Supervision	3	0	0
Profit	161	1	10
	£250	0	0

Cr.

	£	s.	d.
190 tons silage, at 25s. per ton	237	10	0
Grazing 500 sheep for four weeks, at 1½d. per head per week	12	10	0
	£250	0	0

GLEN INNES EXPERIMENT FARM.

R. H. GENNYS, Manager.

THE rainfall for the year was $8\frac{1}{4}$ inches below the average. Late frosts were prevalent, cutting several of the straw crops to the ground in October, but these made a good recovery.

Fuller particulars regarding the season, &c., were published in the *Agricultural Gazette* for April, 1913.

In the following statements the rates quoted are contract rates, obtained from leading local farmers, and should not be confounded with the local farmers' rate, which work out at about 25 per cent. less on all operations. In the case of maize and potatoes, the rates for some of the operations vary slightly from the rates quoted for wheat and oats; this is accounted for by the different depths of ploughing, &c., and the different nature of the soils. Credits are given at the local ruling rates at the time of the principal sales.

In the summarised reports of the actual farm figures, which are given under the detailed statements in each case, debits are made for all the operations, seeds, &c., enumerated in the abovementioned statements, at the actual cost, or, in the case of seed grown on the Farm, at the valuations given below, also for rent at 8s. per acre (5 per cent. on capital value of land), and wear and tear at 2s. 6d. per acre. In addition to the above, charges are made for managerial and office expenses and apprentices' labour. These latter expenses would not be incurred in ordinary farm management. Credits are given at the actual cash prices received in the case of sales and at the following valuations for produce consumed on the farm:—

	£	s.	d.	
Seed wheat...	0	6	0	per bushel.
Seed oats	0	3	6	"
Wheat (2nds)	0	3	0	"
Feed oats	0	3	0	"
Maize	0	3	10	"
Hay...	2	15	0	per ton.
Straw	1	0	0	"

In the general statements it will be seen that in some cases local prices were a little higher. Cartage to mill or rail is charged in all such instances.

The ordinary farmer, who performs his own operations, would, of course, receive the amounts shown opposite the various operations, in addition to the net profits.

PADDOCK No. 1.—18 acres White Tartarian Oats for Hay.

Sown after a rotation crop of Red Clover.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
To Ploughing at 10s. 3d. per acre	9	4	6	By 49 tons 1 cwt. hay at £2 15s. per ton	134	17	9
Sowing with cultivator at 3s. per acre	2	14	0				
Seed, 30 bushels at 5s. ...	7	10	0				
Pickling seed, at 3d. per acre	0	4	6				
Twine, at 3s. per acre ...	2	14	0				
Cutting with binder, 5s. per acre	4	10	0				
Stooking, at 3s. per acre ...	2	14	0				
Carting and stacking, at 12s. 6d. per acre	11	5	0				
Rent, at 8s. per acre... ...	7	4	0				
Balance (net profit) ...	86	17	9				
	£134	17	9		£134	17	9

Profit, £86 17s. 9d., or £4 16s. 6½d. per acre.

Actual farm figures: Debits, £58 3s. 3d.; credits, £134 17s. 9d.; credit balance, £76 14s. 6d., or a profit of £4 5s. 3d. per acre.

PADDOCK No. 12.—27½ acres White Tartarian Oats, and 4½ acres Algerian Oats for Grain.

Sown in new ground on a raw sod, merely disked after one ploughing.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
To Ploughing at 10s. 3d. per acre	16	8	0	By 780 bushels White Tartarian (seed) oats at 4s.	156	0	0
Cultivating at 2s. 6d per acre	4	0	0	207 bushels Algerian oats at 3s.	31	1	0
Drilling at 1s. 8d. per acre...	2	13	4				
Seed, 45 bushels at 5s. per bushel	11	5	0				
Pickling seed, at 3d. per acre	0	8	0				
Cutting with binder at 5s. per acre	8	0	0				
Twine at 2s. 6d. per acre ..	4	0	0				
Stooking at 1s. 6d. per acre	2	8	0				
Carting and stacking at 9s. per acre	14	8	0				
Bags, 27½ dozen at 6s. 9d. ...	9	5	8				
Thrashing at 1s. 3d. per bag	20	11	3				
Cartage to rail at 5s. per ton	4	8	2				
Rent at 8s. per acre	12	16	0				
Balance (net profit)	76	9	8				
	£187	1	1		£187	1	1

Profit, £76 9s. 8d., or £2 7s. 9½d. per acre.

Actual farm figures: Debits, £118 11s. 10d.; credits, £180 14s. 6d.; credit balance, £62 2s. 8d., or a profit of £1 18s. 10d. per acre.

NOTE.—In the farm figures credits are made for all oats at the rate of 3s. 6d. per bushel, but in the statement above White Tartarian oats, being a seed oat, has been credited at seed rates, whereas Algerian, being a feed variety, has been credited at feed rates.

Paddock No. 6.—48 acres Haynes' Blue Stem Wheat for Hay.

Dr.	£	s.	d.	Cr.	£	s.	d.
To Ploughing at 10s. 3d. per acre	24	12	0	By 90 tons of hay, at £2 15s. per ton	247	10	0
Harrowing at 6d. per acre ...	1	4	0				
Drilling, at 1s. 8d. per acre..	4	0	0				
Seed, 45 bushels, at 5s. per bushel	11	5	0				
Superphosphate, 28¼ cwt., at 6s.	8	9	6				
Pickling seed, at 3d. per acre	0	12	0				
Twine, at 2s. 6d. per acre ...	6	0	0				
Cutting with binder, at 5s. per acre	12	0	0				
Stooking, at 2s. 6d. per acre	6	0	0				
Carting and stacking, at 9s. per acre	21	12	0				
Rent, at 8s. per acre ...	19	14	0				
Balance (net profit) ...	132	11	6				
	£247	10	0		£247	10	0

Profit, £132 11s. 6d., or £2 15s. 3d. per acre.

Actual farm figures: Debits, £146 8s. 3d.; credits, £247 10s.; credit balance, £101 1s. 9d., or a profit of £2 2s. 1½d. per acre.

Paddock No. 15.—9 acres Haynes' Blue Stem Wheat for Hay; 15 acres Blue Stem Wheat for Grain; 16 acres Algerian Oats for Hay.

Dr.	£	s.	d.	Cr.	£	s.	d.
To Ploughing 40 acres at 10s. 3d.	20	10	0	By 47 tons 8 cwt. 1 qr. hay at £2 15s. per ton ..	130	7	8
Cultivating 16 acres at 2s 6d.	2	0	0	288 bushels wheat at 3s. 6d.	50	8	0
Rolling 15 acres at 6d. ...	0	7	6	11 tons 4 cwt. straw at £1 ...	11	4	0
Drilling 24 acres at 1s. 8d....	2	0	0				
Sowing with cultivator, 16 acres, at 3s.	2	8	0				
Seed, 22 bushels wheat at 5s.	5	10	0				
Seed, 24 bushels oats at 5s....	6	0	0				
Pickling for 10⅔ acres at 3d.	0	2	8				
Twine, 40 acres, at 2s. 6d. .	5	0	0				
Cutting with binder, at 5s. ..	10	0	0				
Stooking, 25 acres for hay at 2s. 6d.	3	2	6				
Stooking, 15 acres for grain at 1s. 6d.	1	2	6				
Carting and stacking 40 acres at 9s.	18	0	0				
Bags, 8 dozen at 6s. 9d. ...	2	14	0				
Thrashing, 96 bags, at 1s. 6d.	7	4	0				
Carting grain to mill at 5s. per ton	1	18	6				
Rent at 8s. per acre... ...	16	0	0				
Balance (net profit)	88	0	0				
	£191	19	8		£191	19	8

Profit £88; or £2 4s. per acre.

Actual farm figures: Debits, £115 8s. 1d.; credits, £216 7s. 7d.; credit balance, £100 19s. 6d., or a profit of £2 10s. 6d. per acre.

NOTE.—If the grain had been sold at milling rate (3s. 6d. per bushel) instead of at varying prices, the net profit per acre in the farm figures would have been £1 17s. 1d.

PADDOCK No. 14.—26 acres White Tartarian Oats for hay; 9 acres Cedar Wheat for hay; 20 acres Comeback Wheat for hay; 6 acres Jonathan Wheat for hay; 7 acres Genoa Wheat for grain; 7 acres Thew Wheat for grain.

Dr. *Cr.*

	£	s.	d.		£	s.	d.
To Ploughing, 75 acres at 10s. 3d. per acre	38	8	9	By 109 tons 3 cwt. hay, at £2 15s. per ton	300	3	3
Harrowing, 75 acres at 6d. per acre	1	17	6	366 bushels wheat, at 3s. 6d. per bushel	64	1	0
Rolling, 29 acres at 6d. per acre	0	14	6	10 tons 2 cwt. straw, at £1 per ton	10	2	0
Drilling, 75 acres at 1s. 8d. per acre	6	5	0				
Seed, 43 bushels oats at 5s. per bushel	10	15	0				
Seed, 47½ bushels wheat at 5s. per bushel	11	17	6				
Pickling seed, 55 acres at 3d. per acre	0	13	9				
Cutting with binder, 75 acres at 5s. per acre	18	15	0				
Twine, 75 acres at 2s. 6d. per acre	9	7	6				
Stooking for hay, 61 acres at 2s. 6d. per acre ...	7	12	6				
Stooking for grain, 14 acres at 1s. 6d. per acre ...	1	1	0				
Carting and stacking, 75 acres at 9s. per acre ...	33	15	0				
10⅙ dozen bags at 6s. 9d. ..	3	8	8				
Thrashing, 122 bags wheat at 1s. 6d.	9	3	0				
Cartage of wheat to mill, 10 tons at 5s. per ton ...	2	10	0				
Rent, at 8s. per acre ...	30	0	0				
Balance (net profit) ...	188	1	7				
	£374	6	3		£374	6	3

Profit, £188 1s. 7d., or £2 10s. 2d. per acre.

Actual farm figures: Debits, £237 14s. 2d.; credits, £416 14s. 3d.; credit balance, £179 0s. 1d., or a profit of £2 7s. 9d. per acre.

NOTE.—If the wheat had been sold at milling rate (3s. 6d. per bushel) instead of at varying prices, the net profit in the farm figures would have been £1 16s. 2½d. per acre.

PADDOCK No. 13.—32 acres Maize for grain, 6 acres Pumpkins, and $2\frac{1}{4}$ acres Potatoes.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
To Ploughing, twice, at 11s. per acre	44	11	0	By 694 bushels maize, at 4s. per bushel	138	16	0
Harrowing, twice, at 2s. 3d. per acre	9	2	3	7 tons 4 cwt. potatoes, at £5 per ton	36	0	0
Drilling maize, 32 acres, at 2s. per acre	3	4	0	7 tons pumpkins	17	0	0
Cultivating maize twice, at 3s. 3d. per acre	10	8	0				
Seed maize, 32 acres at 1s. 3d. per acre	2	0	0				
Superphosphate, 19 cwt., at 6s. per cwt.	5	14	0				
Pulling and husking maize, 32 acres, 8s. 3d. per acre	13	4	0				
Shelling maize, 32 acres, at 5s. per acre	8	0	0				
$19\frac{1}{2}$ doz. cornsacks, at 6s. per doz.	5	17	0				
Cartage of maize, 17 tons at 5s. per ton	4	5	0				
Planting pumpkins, 6 acres at 2s. per acre	0	12	0				
Cultivating pumpkins twice, at 3s. 3d. per acre ..	1	19	0				
Pumpkin seed, &c. (actual cost)	3	16	0				
Cartage of pumpkins, 7 tons at 5s. per ton	1	15	0				
Planting potatoes, $2\frac{1}{2}$ acres at 19s. per acre	2	7	6				
Hilling potatoes, $2\frac{1}{2}$ acres at 10s. per acre	1	5	0				
Seed potatoes, $2\frac{1}{2}$ acres at £4 6s. per acre	10	15	0				
Digging, 96 bags at 1s. per bag	4	16	0				
8 doz bags, at 10s. 10d. ...	4	6	8				
Cartage of potatoes, at 5s. per ton	1	15	0				
Rent, at 8s. per acre ...	16	4	0				
Balance (net profit) ...	35	19	7				
	£191	16	0		£191	16	0

Profit, £35 19s. 7d., or 17s. 9d. per acre.

Actual farm figures: Debits, £180 2s. 8d.; credits, £190 18s. 10d.; credit balance, £10 16s. 2d., or a profit of 5s. 4d. per acre.

Paddock No. 18A.—12 acres Algerian Oats for Hay.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
To Ploughing, at 10s. 3d. per acre	6	3	0	By 24 tons 10 cwt. 1 qr. hay, at £2 15s. per ton	67	8	2
Cultivating, at 2s. 6d. per acre	1	10	0				
Drilling, at 1s. 8d. per acre ...	1	0	0				
Seed, 18 bushels, at 5s. per bushel	4	10	0				
Pickling seed, at 3d. per acre	0	3	0				
Cutting with binder, at 5s. per acre	3	0	0				
Twine, at 2s. 6d. per acre ...	1	10	0				
Stooking, at 2s. 6d. per acre..	1	10	0				
Carting and stacking, at 9s. per acre	5	8	0				
Rent, at 8s. per acre	4	16	0				
Balance (net profit)	37	18	2				
	£67	8	2		£67	8	2

Profit, £37 18s. 2d., or £3 3s. 2d. per acre.

Actual farm figures: Debits, £34 4s. 0d.; credits, £67 8s. 2d.; credit balance, £33 4s. 2d., or a profit of £2 15s. 4d. per acre.

Summary of Profit and Loss.

Paddock No.	Area	Local Farmers' Contract Figures. Net Profit. Total			Per acre.			Actual Farm Figures. Net Profit. Total.			Per acre		
	Acres.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1	18	86	17	9	4	16	6½	74	14	6	4	5	3
6	48	132	11	6	2	15	3	101	1	9	2	2	1½
12	32	76	9	8	2	7	9½	62	2	8	1	18	10
13	40½	35	19	7	0	17	9	10	16	2	0	5	4
14	75	188	1	7	2	10	2	179	0	1	2	7	9
15	40	88	0	0	2	4	0	100	19	6	2	10	6
18A	12	37	18	2	3	3	2	33	4	2	2	15	4
Total ...	265½	£645	13	3	£2	8	8	£563	18	10	£2	2	7

The Proper Care of Cheese in the Curing-room.

MATTHEW WALLACE, Dairy Instructor.

With the advent of the hot weather we are each season reminded by the condition of cheese arriving on the market **how inadequate is the provision made at many of the factories and farms for the proper curing and storing of the cheese until it is ready for marketing.**

Of the cheese-rooms in use in this State, there are not more than 25 per cent. in which it is possible to maintain temperatures suitable for curing cheese successfully.

These buildings range from properly-insulated rooms—some of them built on the cellar principle, with sub-earth drains for admitting cool currents of air—to single weather-board rooms, often placed on blocks 18 inches from the ground and open underneath, the temperature of which in hot weather is little different from the ordinary shade temperature, and may at times be as high as 100 degrees Fah.

In the ripening of Cheddar cheese, the best results are obtained at temperatures between 50 degrees and 60 degrees Fah.; but there is only a small proportion of the cheese manufactured in New South Wales ripened at these temperatures.

The importance of proper curing-rooms has been repeatedly emphasised by me during the visits to the various factories and farms all over the State where cheese is manufactured, but the progress of improvement has been very slow.

Why some of the cheese-makers of the State should, year after year, store cheese in rooms which are little better than ovens seems incomprehensible, in view of the enormous loss incurred.

Apart from the actual loss in fat, the very finest cheese which it is possible to produce is injured to an almost incredible extent.

The Dairy and Cold Storage Commissioner of Canada, after extensive and exhaustive experiments, states that 60 degrees Fah. is the most suitable temperature at which to ripen Cheddar cheese, and has recommended the adoption of this temperature in the cheese-curing rooms of Canada.

He also arrived at the following conclusions:—

1. Cool-cured cheeses are invariably better in texture and flavour than cheese from the same batch cured at ordinary summer temperatures.
2. The saving in shrinkage amounts to $1\frac{1}{2}$ per cent. during the first two weeks, according to the moisture in the cheese.

3. The surfaces of the cheese should be allowed to dry thoroughly before the cheeses are placed in the cool-room.
4. If cheese is exposed to a high temperature within twenty-four hours after being taken from the press, there is a permanent injury which no subsequent cool-curing or cold storage will remedy.

This last conclusion is so important that it should be written in capital letters, and posted up in every cheese-making factory and farm in the State.

It has also been observed that cheese which has been subjected to high temperatures in the early ripening stages shows a tendency to lose fat at lower temperatures than cheese which has been maintained at temperatures not exceeding 60 degrees Fah.

When the local market absorbed all the cheese produced, and there was practically no competition, the matter of storage may not have been so urgent, even though the loss to the producer was as great; but that period in the history of cheese-making is now past, and cheese made in the adjoining States now competes on the Sydney market.

The disposition of some factories to export part of their output of cheese makes the proper control of temperatures in the curing-rooms one of great urgency.

The storing of cheese for export at normal temperatures is one of extreme importance to the industry, if the produce of our factories is to be placed before the British public in good condition and attractive in appearance.

Pullar's Cling Peach.

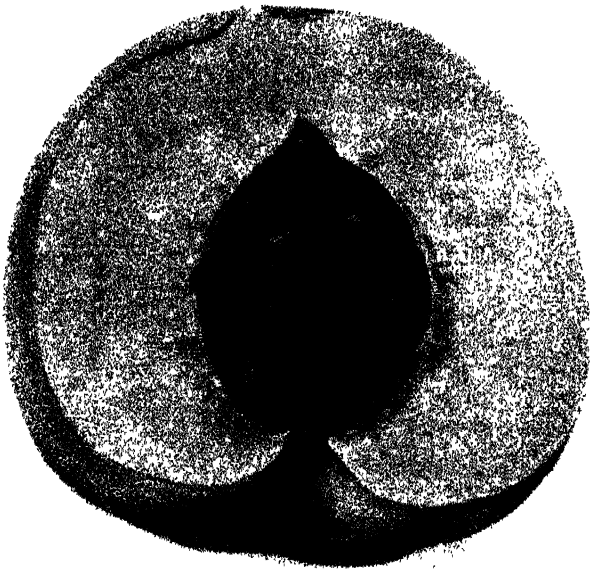
(See Coloured Plate).

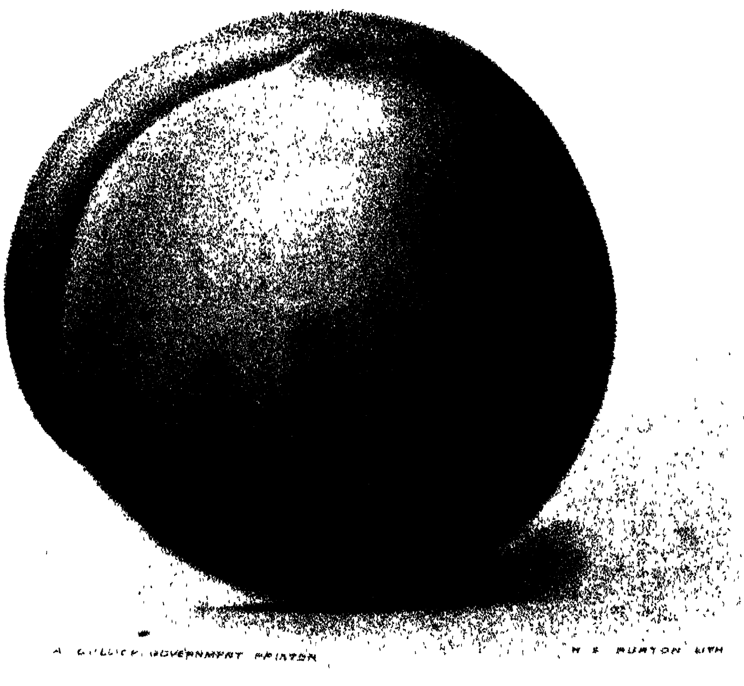
This was a chance seedling discovered by Mr. P. Pullar in his orchard at Ardmona, Goulburn Valley, Victoria. The variety first attracted Mr. Pullar's attention as an odd tree in a block of Brigg's Red May peaches. As it was found to be a strong, vigorous tree, the variety was further tested, with satisfactory results.

It is an excellent cropper, bearing regularly, but the flavour of the fresh fruit is not very good. From a canning and shipping point of view, however, it is one of the most sought after. As it has proved so suitable under irrigation in the Goulburn Valley, Victoria, it is evident that its planting under the Murrumbidgee Irrigation Area conditions is warranted. Young trees of this variety, as a matter of fact, have been largely planted at Yanco, and from present indications are doing very well indeed. The following notes of this variety are taken from specimens of fruit grown at Ardmona:—

Pullar's Cling Peach.

Size.—Medium to large.
Form.—Roundish oblate, sides uneven, one side with a decided lip.
Suture.—Distinct and deep.
Colour.—Light to deep reddish, yellow on sunny side, and white to whitish yellow on shaded side.
Stem.—Deep set, in a wide cavity.
Flesh.—Texture coarse, colour from light greenish to whitish yellow, flavour moderate.
Stone.—Cling, medium size.
Use.—Suitable for canning.
Date of Ripening.—Middle of March.





A. GULLICK, GOVERNMENT PRINTER. W. E. BURTON, LITH.

Milk and Butter Records.

Under the United Pure Breeders' Association Scheme.

M. A. O'CALLAGHAN.

Last month the records of a few of the earliest cows that were tested from the herd of Mr. O. H. Gollan, of Woodburn, were published. This month the records of fifty more cows, the property of the same owner, are given. This makes a total of fifty-nine completed to date from this herd.

This is the spirit in which pure breeders should enter into the wo k of testing. Every cow in the herd should be submitted to the test, and then the breeder knows where he stands, and the public who wish to purchase bulls of the breeds concerned, also know where they stand. The testing of just a few cows in the herd, for the purpose of making an advertisement, is to be condemned, and intending purchasers of bulls should not be led away by any excuse to purchase a bull from a cow that has not been tested, even though other animals in the same herd have shown good results.

Mr. Manning, the President of the Jersey Society, entered into the testing business in exactly the same spirit as Mr. Gollan, the Darbalara Estate, and others have done, and each has, taking into account the adverse seas n, put up a very creditable record. From this out dairy farmers who desire to purchase Jersey bulls should have no difficulty in obtaining information regarding the dairy qualities of the dams of such animals, and it is only by attention to this matter that we can expect a general improvement in the milk and butter producing capacity of our dairy stock.

Unfortunately, some of the breeds have not yet been represented in these official tests. The Jersey breeders have taken the matter up more warmly than the representatives of any other breed. The Shorthorn breeders have also been well represented by one or two herds. A few Holsteins are being tested, also some Guernseys, but not a single representative of the Ayrshire breed has yet submitted his cattle to this searching test. If Ayrshire breeders in this State intend to hold any place of importance in the dairy cattle-breeding industry, they must hurry up or their breed will be forgotten by those in search of stock to improve their general herds.

Records of two of Mr. Perry's Guernsey Cows, at "Nundoorah," Parkville.

Name of Cow.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on Last Day of Test.	
					Milk.	Butter.
	yrs. m.		lb.	lb.	lb.	lb.
La Colombe (imp.) ...	3 9	25 Oct., 1912	6,598	364	17·50	1·00
Mignotte (imp.) ...	3 2	17 Sept., 1912	5,786	331	14·50	·94

Records of Mr. O. H. Gollan's Jersey Herd at Woodburn.

Name of Cow.	Age at beginning of Test.		Date of last Calving.		Total Milk.	Total Butter.	Yield on Last Day of Test.	
							Milk.	Butter.
	yrs.	m.			lb.	lb.	lb.	lb.
Twylish's Pride ...	4	2	22 Oct.,	1912	3,737	277	9·00	·80
Gaiety Girl	4	0	10 ,,	,,	6.800	342	8·50	·55
Woodburn Canary ...	4	0	26 ,,	,,	4,660	299	4·50	·45
Thelma of Melrose ...	9	4	10 ,,	,,	4,905	267	9·50	·66
Lustre III	9	0	23 July,	,,	4,146	268	13·50	1·05
Olive Lotus	6	0	9 Sept.,	,,	4,333	241	3·75	·25
Dora	7	0	12 Nov.,	,,	4,860	253	3·50	·22
Bella	7	0	20 ,,	,,	5,888	295	12·50	·70
Balm VI	3	2	30 Oct.,	,,	3,367	202	5·75	·37
Lemon Blossom ...	6	0	11 ,,	,,	5,296	252	8·25	·49
Canary's Purity ..	3	0	24 ,,	,,	5,235	317	11·00	·77
Daphne's Princess ..	1	9	6 ,,	,,	3,237	206	5·50	·43
Amy	3	0	26 Aug.,	,,	5,144	266	9·75	·67
Bemboka Gem	2	0	26 Sept.,	,,	3,435	222	4·50	·38
Silver Gown	7	0	2 Oct.,	,,	5,121	263	4·25	·27
Goolmangar Primrose I	3	3	25 Aug.,	,,	4,262	296	8·00	·77
Canary's Violet II ..	3	0	5 Sept.,	,,	4,577	239	2·50	·22
Brighton Silver ..	3	0	26 ,,	,,	3,709	232	5·25	·42
Sydney III	4	2	21 Aug.,	,,	6,154	409	18·50	1·53
Lady Clementine ..	4	0	28 Nov.,	,,	4,019	255	6·50	·47
Luxury	9	6	6 July,	,,	5,854	356	14·50	1·10
Kamarel ...	6	9	7 Sept.,	,,	4,081	264	7·00	·64
Peggy Pryde . .	7	0	16 Aug.,	,,	6,215	282	17·50	1·34
Cinderella . ..	2	0	6 Oct.,	,,	4,680	300	8·00	·61
Canary's Verbena ..	3	0	18 Sept.,	,,	5,898	358	10·50	·79
Van Tromp's Princess ..	5	6	2 Aug.,	,,	5,064	252	12·75	·75
Magnet's Princess III ..	5	6	20 Aug.,	,,	3,461	254	7·50	·72
Teressa	3	0	28 Nov.,	,,	4,568	227	11·50	·72
Nellie Stewart	6	0	16 ,,	,,	5,356	326	9·50	·55
Honeydew	7	0	18 ,,	,,	5,036	253	8·50	·46
Clementine of Woodburn.	3	6	8 ,,	,,	4,615	318	8·50	64
Rosemary	4	6	23 Dec.,	,,	3,643	212	8·75	·49
Fidget	6	0	9 Feb.,	1913	3,998	213	10·50	·58
Flower Girl	6	0	18 ,,	,,	4,229	222	10·50	·65
Minnie	5	0	26 Dec.,	1912	3,628	258	8·50	·64
Canary's Blue Bell ...	3	6	28 ,,	,,	4,390	250	11·50	·64
Tiny of Woodburn ..	5	0	11 ,,	,,	5,054	279	16·00	·83
Maitland's Pansy ..	3	6	12 ,,	,,	3,800	251	9·50	·63
Woodburn Jessamine ...	5	0	19 Jan.	1913	5,070	282	13·00	·82
Bracelet	6	0	2 Dec.,	1912	5,378	279	9·50	·62
Millie	6	0	4 Feb.,	1913	5,071	255	8·50	·56
Maitland's Belle . .	3	6	15 Dec.,	1912	4,814	363	14·00	1·07
Handsome Lass ...	5	0	24 ,,	,,	4,257	253	11·00	·74
Kitty of Woodburn ...	8	0	5 Mar.,	1913	4,725	234	12·50	·61
Mildred	6	0	27 Feb.,	,,	4,333	263	8·00	·54
Sunbeam	8	0	14 Mar.,	,,	4,244	203	9·00	·36
Juanita of Woodburn ...	5	0	24 ,,	,,	4,964	282	14·75	·79
Sweet Lemon	7	0	25 April,	,,	5,112	276	12·50	·61
Peggy Pryde III ...	2	9	18 ,,	,,	4,392	216	7·75	·40
Dunalister Lista ...	2	9	30 ,,	,,	3,143	202	6·75	·43

Bacon Curing.

H. W. POTTS, Principal, Hawkesbury Agricultural College.

In curing pork for bacon, we have the knowledge that this class of flesh is specially adapted to salting and smoking, by which its digestibility and wholesomeness are increased rather than diminished, as is the case with beef and other meats. The granular form of fat in bacon is easy of digestion, and can be eaten by most persons to whom any other fat is intolerable. Hence bacon is frequently used for delicate children, and where the free use of fatty foods is indicated for persons suffering from wasting diseases or requiring readily digestible fatty articles of diet.

It has been determined as a result of ages of experience, as well as scientific investigation, that the use of salt in preserving food has no appreciable influence on health other than favourable.

Salting is one of the oldest methods known of preserving meat for man's use.

Salt acts as a dehydrating agent on flesh; in other words, it removes water retained in the tissues of the animal body. It is also mildly antiseptic in its action, and in this way assists to preserve.

The flesh of the pig does not absorb or take up salt so readily as other meats, owing to the large proportion of fat to lean.

The length of time pigs' flesh should be submitted to the influence of salting depends on various conditions.

Some breeds of pigs give a greater proportion of fat. The absorption of salt in this case is slower.

The size, thickness, age, and weight of the flitches and hams have to be considered.

It requires less time to cure in a damp cellar than in a dry room.

The extremes of heat and cold are unfavourable. In the former case, flesh is liable to decompose before the salt permeates it sufficently to cure it.

Where subject to an excessively low temperature, the meat juices become set and the flesh too firm for the salt to penetrate.

Precautions should be observed to have the tables and room in which curing is conducted scrupulously clean, free from dust, and with a sweet atmosphere.

Temperature of Curing Room.

It has to be remembered that a constant temperature is a leading factor in securing a good cure, in addition to a humid atmosphere. It requires less time to cure bacon in a damp cellar where the temperature varies between 40 degrees Fah. and 50 degrees Fah. than in a dry atmosphere with a higher temperature. In all cases the extremes of temperatures are unfavourable.

When they are high decomposition sets in before the curative processes have begun, whilst when low the meat juices become fixed or set, and the flesh is too firm to permit the specific action of the salt to take effect, except at a slow rate, and thus the progress of curing is retarded.

The ideal temperature for curing bacon is 42 degrees to 45 degrees Fah., but as these conditions are not always available on the farms throughout the State, it should be noted that the temperature of the curing room ought never to exceed 60 degrees Fah., and the nearer the temperature is to the ideal the better. Curing should therefore only be conducted during the cooler months of the year, and preferably during frosty weather when the temperature at night goes sufficiently low to ensure that the curing room keeps at a low temperature all through the day.

A cellar is generally preferred as a curing room, as the temperature is less likely to vary there than anywhere else. The humidity (which should register 76 per cent. on the hydrometer) is usually greater there, and the room is also darker, which is an important point, as the meat loses its colour if kept too much in the light.

To make provision for cooling the room down when the curing has to be done in other than frosty weather, hang bags in the doorway or in the window space, and keep these bags moist by allowing water to drip on to them from cans suspended above.

Salting.

It was at one time deemed good practice to rub the flesh briskly every day, but it is generally found that this is only necessary for the first three days. The salt mixture only requires to be spread over the flesh evenly. An exception may be made in the case of large thick pieces or where the flesh is very cold; then brisk rubbing is advantageous. The salt should be pressed into every depression, and well into the back ends where the feet have been cut off, and into the joints.

To continue the hard rubbing too long results in a hardened cured flesh.

Brown sugar is used in varying quantities with salt, in order to correct the hardening influence of salt on meat. It also renders the bacon mellow, and increases its juiciness and flavour.

Sugar may also be classified amongst the mild antiseptics as a meat preserver.

The addition of sugar to salt used in preserving adds to the brightness and colour of the meat.

The Purpose of Saltpetre.

Saltpetre, also known as nitre, sal prunella, or potassium nitrate (KNO_3), is used in curing.

It possesses mild antiseptic properties, but it is chiefly added to preserve the natural colour of the flesh. When salt is used alone, the natural flesh colour fades and lessens the attractiveness of the bacon.

Attention must be given to the quantity used, seeing, if applied in excess, it has the effect of unduly toughening the meat and changing the natural colour to a deep brown. This again fades to a clay colour when the bacon is cooked. Bacon-curers apply the term "fired" to this condition.

The quantity should not be more than one part to twenty-five of salt.

All ingredients used in the mixtures applied for curing should be of the best quality and thoroughly mixed, and applied at the same temperature as the flesh when ready for curing. To obtain the latter condition, the mixture should be stored in the curing room for a day or two before the curing commences, and kept there throughout the cure.

Spices.

Spices of a harmless nature are frequently used for flavouring purposes, and may be selected from the following :—Cayenne pepper, white and black pepper, nutmegs, corianders, garlic, juniper berries, bay leaves, allspice, ginger, sage, cloves, cinnamon, bruised eschalots, thyme, mace, marjoram and mustard.

To Fix Colour.

Immediately after cutting up and trimming, the surface of the flesh should be dusted over with equal parts of fine salt and finely-ground saltpetre. This is best effected either through a horse-hair sieve or a flour sifter. Only a light dusting is required, and this is allowed to remain on for twenty-four hours, and then washed off. It acts as a mordant to fix or render permanent the natural flesh colour of the meat, which is a most important consideration in all meat preservation.

The actual curing can be conducted in several ways, but it must again be urged that each operation should be conducted under rigid conditions of cleanliness, in a cool, sweet atmosphere with a temperature ranging from 42 degrees to 60 degrees Fah.

Pickling.

Numerous recipes are available for curing bacon. The following is recommended :—Clean rain water, 20 gallons ; fine dairy salt, 50 lb. ; brown sugar, 5 lb. ; saltpetre, 2 lb. ; allspice, ½ lb. Dissolve the salt, sugar, and saltpetre in the water and immerse the allspice tied up in a calico bag. Boil for one hour and skim off any frothy matter rising to the surface whilst boiling. Allow this solution to come down to the temperature of the curing room before placing in the pickling vat, barrel, or tub. This is sufficient for 500 lb. of meat.

The sides should be rubbed with salt for two days before being immersed in the pickle. It may be necessary to place sufficient weights on the sides to keep them immersed. If this is done see that clean pieces of hardwood are used, and soak them well in waste pickle before use.

The time the meat is in pickle will be determined by the size of the sides, but it is usually three weeks.

Dry Curing.

This recipe has given good results :—Fine dairy salt, 50 lb.; brown sugar, 5 lb.; saltpetre (powdered), 2 lb. Mix well.

For the first three or four days this mixture, after the mordant has been applied, should be rubbed in over the fleshy parts and around the bones and joints. Afterwards spread the mixture freely over the sides, say twice a week, allowing more salt, &c, on the hams and shoulders, less along the back, and least of all on the bellies.

Stack the sides, flesh side up, one on top of the other, and in such a position that as the salt dissolves it will run towards the thicker portions of the side, and to the ham and shoulder. Alternate the stacking so that the side on the top one day will be at the bottom the following day, and so on. About fourteen days are required in the stack, according to the size of the sides.

Other Recipes.

When a sweet, juicy, mild-cured bacon is required, the following may be used instead of the foregoing :—Sugar and salt (medium) in equal parts, well mixed. This bacon does not keep sweet so long as that carrying less sugar.

To impart a distinctive flavour this famous French recipe is given :—Fine dairy salt, 6 lb.; brown sugar, 6 lb.; allspice, 1 lb., mustard, 1 lb.; saltpetre, 1 oz.; bicarbonate of soda, 1 oz. Rub over the flesh daily for three days, and afterwards follow as advised above, turning the sides each time the meat is restacked.

Washing.

At the conclusion of this salting process the meat is removed from the curing stack or vat, and the sides prepared for the final processes. Take each piece separately and drop on to a table or bench, so as to "knock out" any free salt that may be left on the side. Any loose pieces of fat or flesh could also be cut off, and the meat then placed in a vat of cold water in which 1 lb. of bicarbonate of soda had been dissolved for every 20 gallons of water. This soda solution removes excessive saltiness and makes the curing milder. Allow the meat to remain in the solution, flesh side down, for twenty-four hours, then remove and wash well in a bath of lukewarm water (90 degrees Fah.). If necessary, any further trimming can be done now, and any sharp pieces of bone cut off, leaving the side neat and shapely.

Now use the ham stringer, and place a piece of stout twine through and around the end of the ham in the side, a piece in the neck end for the flitch, and on the belly for the middle piece, and hang in a room free from dust and insects, with a full current of air for, say, three days. The drying is very important, for if this is not properly done the meat will not take the smoke well. If the weather should be unfavourable to the meat drying and no mechanical means for drying are available, it would be better to hang in the smoke house and dry by means of heat from a dull hardwood fire.

When sufficiently dry and ready for smoking, lightly rub olive oil over the skin and flesh, and the meat is ready for smoking.

Smoking the Bacon—Its Objects and Effects.

In addition to a drying and preserving action upon meat, smoking imparts a relishable flavour which adds to the value of the bacon. The process of smoking preserves flesh by coagulating the albumen near the surface, and forming a protecting envelope.

It has been ascertained that in smoking bacon there is no loss of nutriment, and it is as digestible as fresh meat. The smoke creates a distinct antiseptic or preservative action, apart from the dried albuminoid coating, by depositing on the surface creosote, formaldehyde, and pyroligneous or crude acetic acid. These check the action and growth of putrefactive organisms and their processes, retard decomposition and impart a delicate and appetising flavour. The effect of all is nullified if the meat has not been properly dried before being placed in the smoke house.

The Smoke House.

The building should be from 10 to 12 feet high, but the floor space must be judged by the amount of meat it is intended to smoke, it being necessary that the sides should hang separate from one another, so that the smoke may reach every portion. The building should be of galvanised iron or brick, and the floor of brick or cement, with a depression in the centre away from the walls in order to avoid the risk of setting fire to the uprights.

There should be no light in the room, as sunlight has a tendency all through the curing process to bleach the bacon and deprive it of its natural colour.

Ventilation should be provided, and it is necessary to be able to control it so as to regulate the fire. A ventilator at the bottom of the door is very useful, as also is one on either side in the roof of the building, and there should be another on the top; all of them to be movable from the ground level outside.

The aim is to surround the bacon with a dense atmosphere of smoke at a comparatively low temperature, the latter never exceeding 90 degrees Fah. during the period of smoking.

The Fire.

Many methods of creating a proper class of smoke are applicable; probably hardwood, oak, white pine, or cedar sawdust (dried), with a few damp corn-cobs and a few green eucalyptus leaves will answer to kindle a fire with a good development of smoke without much heat, or "essence of smoke" (pyroligneous or crude acetic acid) may be sprinkled over the smouldering sawdust.

Direct heat can be prevented from reaching any bacon that is hanging over the fire by having a sheet of galvanised iron placed on a column of loose bricks or stones. The smoke must be conveyed to the bacon cool, for if direct heat reaches the bacon the fat will melt and run, and with it will go part of the flavour of the meat.

Colour.

In deciding the length of time to leave in the smoke house, the desirable colour must be considered. This is usually a light brown or tan, and to obtain it smoking may occupy any period from one to three days. The character of the flesh, its thickness and other characteristics require to be estimated in order to obtain perfection in colour and flavour. When the desired colour is obtained, open the door and ventilators and allow the meat to cool down before handling it; from this time onwards the meat should be handled as little as possible, as the "bloom" may be rubbed off it.

If necessary, finish the sides then by dressing or rubbing the skin and flesh with pure olive oil. This is done more to give the meat a nice appearance than anything else, though it also tends to keep away flies, &c.

Smoked bacon will hang well in the smoke house until required, provided resonable care be taken to exclude insects and to keep the place very dry, dark, and cool. Any degree of dampness or moisture in the atmosphere in which the bacon hangs will end in mouldy bacon.

Packing and Storing.

Where it is proposed to pack the bacon or hams, in order to prevent attacks by insects or other troubles, the flesh may be rolled in bran, coarse oatmeal, shelled oats, pea meal, beeswing chaff, or wrapped in clean white packing paper and stored away on shelves or in boxes.

Every effort should be made to prevent blow-flies and other pests from gaining access to the meat, for they leave their eggs, &c., on the flesh and in its numerous interstices; and later on these give endless trouble. A simple means of checking their depredations is to sprinkle the surface of the meat with black pepper, or a mixture containing this and cayenne pepper. Another effective plan is to saturate calico, hessian, or clean bagging in a creamy mixture of lime and water, and wrap it round the ham or bacon after it has been rolled in oatmeal bran. Stitch the covering closely round the flesh, and hang in a cool place till required

Wood-boring Moths Attacking Vines.

A correspondent at Mangrove Mountain, *via* Gosford, forwarded a specimen of some moths which he found were laying eggs in thousands on his vines. He was anxious for the insect to be identified, and to know whether the ensuing grubs were injurious or not.

In reply, Mr. W. W. Froggatt, F.L.S., stated that the large moth sent was one of the wood-boring moths of the family Hepialidæ (*Trictena* sp.) which bores in the roots and butts of trees, but has not been recorded as attacking vines. It would be advisable to destroy all the eggs noticed, in case any of the hatching grubs crawled down and bored into the butt of the vine.

Analyses of New South Wales Wines.

[Continued from Vol. XXIV, page 894.]

F. B. GUTHRIE AND L. A. MUSSO.

Series VIII.

The wines of which the analyses appear in Table VIII come from a vineyard in the Riverina district. The tests show that the quantity of volatile acidity is very low, except in the sweet red, where, however, its amount is far from excessive. The percentage of extract and of ash are well up to the average.

The sweet white has been fortified to a reasonable extent; the sweet red also. In the latter case, however, a considerable quantity of sugar was unfermented. The samples represent wines of a good standard, and creditable to the district.

Series IX.

The results of the analyses show the wines to have a normal composition, but their volatile acidity, while very low in sample No. 1, is considerably higher in the other three samples, and particularly in No. 2, where it must be regarded as excessive. This fact indicates clearly that these samples have not received the same amount of attention as No. 1, either in the fermentation process or when stored in the cellar. It is evident that the raw material was good, but the wines have been nearly spoilt through negligence. No. 1 sample has kept very well. (For Tables VIII and IX, see following page.)

Bunted Ears of Wheat.

Specimens of wheat grown in the Toogong district were recently forwarded to the Department. They were taken from crops in which many heads contained half good wheat and half smut. It was requested that reference should be made in the *Agricultural Gazette*, "as there are a lot of farmers who hold different opinions about it."

In his report the Chief Inspector of Agriculture stated:—

During harvesting operations bunt balls burst, scattering their spores over the harvested grain.

When the seed is sown the following season without having been pickled, with some of these spores attaching to it, the following action takes place:—

The wheat seed germinates and grows into a plant; almost at the same time the spores or seed of the bunt fungus also germinate and send their hyphæ, *i.e.*, their tiny rootlets, into the young wheat plant with which it grows up, eventually reproducing in the wheat ear, resulting in the well-known bunt balls. Reproduction frequently occurs in some of the spikelets, so that part of the ear is filled with grain and the other part is filled with bunt balls. The lower spikelets are those which are almost invariably attacked first.

Table VIII.—Analyses of New South Wales Wines.—Series VIII.

Name of Wine.	Specific Gravity at 15·5°C.	Absolute Alcohol by volume per cent.	Percentage of Proof Spirit.	Total Acids as Tartaric.	Fixed Acids as Tartaric.	Volatile Acids as Acetic.	Extract.	Ash.	Sugar.	Tannin.	Total Tartaric Acid.	Potash as Bitartrate.	Tartaric Acid free.
Dry Red, 1911 vintage	0·9943	14·84	26·00	0·595	0·505	0·072	3·42	0·238	0·69	0·050	0·258	0·222	0·079
Sweet White, 1912 vintage ..	1·0114	18·03	31·61	0·50	0·40	0·08	8·59	0·202	6·35	trace	0·216	0·144	0·099
Sweet Red, 1912 vintage ...	1·0704	14·93	26·17	0·52	0·35	0·141	23·14	0·252	18·36	0·187	0·180	0·140	0·066
Dry White, 1913 vintage	0·9914	15·02	26·33	0·48	0·41	0·054	2·59	0·164	0·25	0·005	0·441	0·204	0·286

Table IX.—Analyses of New South Wales Wines.—Series IX.

Name of Wine.	Specific Gravity at 15·5°C.	Absolute Alcohol by volume per cent.	Percentage of Proof Spirit.	Total Acids as Tartaric.	Fixed Acids as Tartaric.	Volatile Acids as Acetic.	Extract.	Ash.	Sugar.	Polarimeter reading.	Total Tartaric Acid.	Potash as Bitartrate.	Tartaric Acid free.	Tannin.
No. 1 Sherry	1·0092	17·81	31·22	0·44	0·38	0·05	7·97	0·200	6·53	—6° 32′	0·253	0·242	0·060	trace.
No. 2 Sherry	1·0156	16·61	29·11	0·67	0·38	0·234	9·31	0·232	7·76	—4 19	0·154	0·178	0·012	0·012
No. 1 Port...	1·0148	19·39	33·96	0·65	0·44	0·170	9·80	0·182	7·66	—4 0	0·130	0·136	0·021	0·031
No. 2 Port...	1·0023	20·33	35·63	0·66	0·41	0·205	6·82	0·30	3·62	—4 21	0·116	0·133	nil.	0·034

The Fowl Tick.

JAMES HADLINGTON.

PERHAPS the greatest handicap to poultry-keeping in some of the hot, dry districts of this State is the loss caused by fowl tick, *Argas persicus*. Yet all that is required to combat it is knowledge, and a little perseverance, such as is required to make any branch of agriculture a success. Admittedly the fowl tick is a serious problem for the poultry-keeper in these districts, but not more so than many other pests that the farmer is successfully combating. Reliable information on how it can be successfully fought and eradicated, and a proper method of keeping and housing the fowls, are the first requisites to successful poultry-keeping. One cannot help being impressed with the want of "system," as shown in the dilapidated poultry structures seen in all directions where abortive attempts have been, and are still being made, to keep a few fowls. Instead of the fowl being treated as a potential producer of a valuable product, and a most profitable one at that, it receives but scant attention, and is almost left to shift for itself. No intelligent farmer in any other line would expect such methods to be successful. Then why not apply a little common-sense attention to the poultry? This want of method is all the more surprising when one considers that in many country towns and hamlets in this State, such a valuable product as a fresh egg is almost an unobtainable luxury, although feed is cheap, and the only obstacle to successful poultry-keeping is want of knowledge and system in fighting the fowl tick.

Not so Formidable.

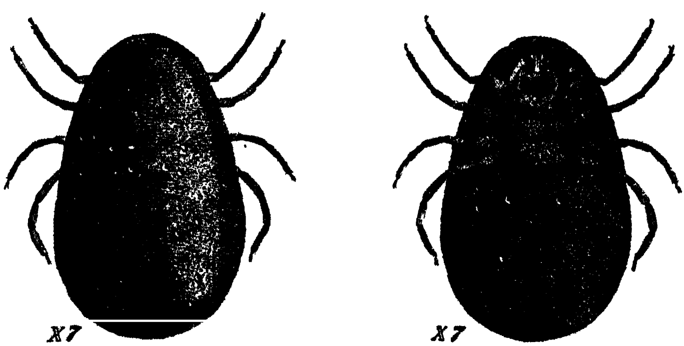
In the light of definite knowledge of the life-history and habits of the fowl tick, and the simple measures that have been found successful in its eradication, it is not nearly the formidable pest it is generally considered to be. In my contact with poultry-breeders all over Australia, I have for many years advised that kerosene emulsion, properly and systematically applied, would be found an effective weapon against this pest, and that there was no need for building houses with tar joints, &c., which in any case would only crack with age and form further harbour for the tick. I have carried out a series of definite experiments, which have proved this remedy entirely effective in the eradication of fowl tick. The method of destruction is so simple that, in my opinion, it should be made obligatory upon poultry-keepers in infested places to exterminate this pest, or give up poultry-keeping. It is of course understood thoroughly that a percentage of poultry kept in infested places become immune to the attacks; but the immunity here obtained for a small percentage is at the expense of a large number, because it is only the survivors of an attack that become immune, while the greater proportion fail to survive. It is clear that poultry-keeping under these conditions can never be profitable.

Symptoms.

The symptoms exhibited by fowls having been inoculated by the tick with Spirochætosis are not widely different from many other ailments from which fowls suffer. The chief distinguishing feature is a decided rise in temperature, varying in accordance with the severity of the fever. The fowl appears to mope a little, is apt to go off its feed, and is restless and evidently in distress; the feathers about the head appear ruffled, and often stand almost straight up; the face appears anxious and haggard, the comb turns dark and shrinks. There are often some symptoms of paralysis. Diarrhœa nearly always makes its appearance, and not infrequently the owners come to the conclusion that the fowls are suffering from cholera. When these symptoms appear, poultry-keepers in districts liable to tick should at once thoroughly examine their fowl-houses and roosts, or any places occupied by poultry; every crack and crevice in the immediate vicinity should be scrutinised to ascertain if there is tick infestation, and if so, the chances are that the trouble is traced to its source. It may be mentioned that the tick is less active in cold than in warm weather, and even where there is considerable infestation, it may not become apparent until the warm weather sets in. Another feature is that the older fowls having become more or less immune to the spirochætosis inoculation, the trouble is not so apparent again until the new season's stock is partly reared, when it has fresh blood to work upon, and the trouble reappears.

Life-history of the Fowl Tick.

Reference to the actual identification of the disease communicated by the fowl tick is made elsewhere, so it is proposed in these notes to adhere to the practical side, as can be seen and followed by every farmer in his efforts to rid his poultry yard of the ticks. The adult tick is rarely found



Upper or Dorsal Side. Under Side.

The Fowl Tick, *Argas persicus*, Oken.

upon the fowl itself, except at night. During the hours of light it secretes itself away in the cracks and crevices of the fowl-house, fences, loose bark of trees, and any place where the fowls roost or congregate at night; there the tick lives and lays its eggs. When the larval tick hatches, it comes out

and attaches itself to the fowl, principally on the parts least covered with feathers, such as under the wings, thighs, &c. The larval tick remains attached to the fowl for a few days, then assumes the nymph stage, drops off, and crawls into the crevice, and there casts its skin, and afterwards comes out for another engorgement; repeats this process, and ultimately emerges a full-grown tick, afterwards keeping up its periodical visits and round of existence.

For a technical description of the Fowl tick (*Argas persicus*) and allied species, readers are referred to an article by Mr. W. W. Froggatt, F.L.S., Government Entomologist, in the *Agricultural Gazette* for March, 1912, page 254.

It is customary for many writers to treat this pest as purely a blood sucker, and many poultry-keepers in infested places still cling to this notion, and ascribe all the trouble to this main cause and also to the irritation caused by the bites. The serious consequences have also been attributed to septicæmia, or septic blood-poisoning. These are, however, only part of the trouble. The really deadly effects of tick are caused by an actual blood parasite transmitted to the fowl by the tick, which induces a kind of fever. This runs its course in a few days, and either kills the fowl outright, or leaves it a wreck so that it either dies from anæmic conditions or survives and becomes immune to further effects of the inoculation by this parasite.

Piece of old splintered wood, infested with Fowl Tick.

How to Eradicate the Tick.

The first essential in attempts to fight the tick is to properly (not necessarily elaborately) construct fowl-houses and roosts, and the birds should be so controlled that they will occupy the houses or roosts provided for them. It may be considered that this is not a practical proposition

under all conditions; but I maintain it should be. The use of wire-netting and the application of intelligent methods will readily solve that problem. For instance, even when fowls are run at large on free range, they can be controlled at roosting time. All that is necessary is an enclosure of wire-netting attached to the fowl-house, where the fowls can be accustomed to feed. The gate of this enclosure can be shut, and the fowls confined to their house for the night. It has already been shown that the trouble from the tick comes at roosting time; therefore, if the fowls are confined to their regular quarters the tick can then be controlled in one spot, instead of in fences and trees all over the farm.

Open-fronted houses constructed of corrugated galvanised iron, with the framework on the outside, will meet the case, with or without suspended perches; but unless perches are so suspended as to be fairly rigid, it is best to abandon that plan. A non-rigid perch is only a delusion, and causes the fowls to roost on the floor of the house. This is worse than perches on cleats.

The next best material with which to build houses is probably hardwood sawn palings, which, if well seasoned and put very close, edge to edge, make a fairly good house. The "lap and space" paling system is of course better from a construction and draught-proof point of view, but it affords more harbor for tick; but the worst of all material is rough bush timber, or tongued and grooved boards. These should not be used where fowl tick is likely to be troublesome. If corrugated galvanised iron be used, it should be painted to keep the houses cool.

Spraying the Poultry Houses.

To do this work properly, a good force-pump with hose such as is used by orchardists is necessary, so that every crack and crevice in the fowl-house can be reached with the kerosene emulsion. Where there is bad infestation, two, three, or even more sprayings are necessary. One spraying is of little or no use, and these should be given at intervals of a day or two between each, so that any that are missed by the first spray, or those dropping off the fowls at the period stated above, will be caught with the subsequent sprayings until they are all exterminated. When these spraying operations are thoroughly understood they involve less time than would appear at first sight.

How to make the Emulsion.

Boil 1 gallon of soft water and dissolve in it 8 ounces of soft soap, take off the fire, and add slowly 1 gallon of kerosene; stir briskly for ten minutes or more until the oil is thoroughly incorporated with the soap water and appears like thick cream, then add slowly, stirring all the time, 10 gallons of soft water (hard will not do).

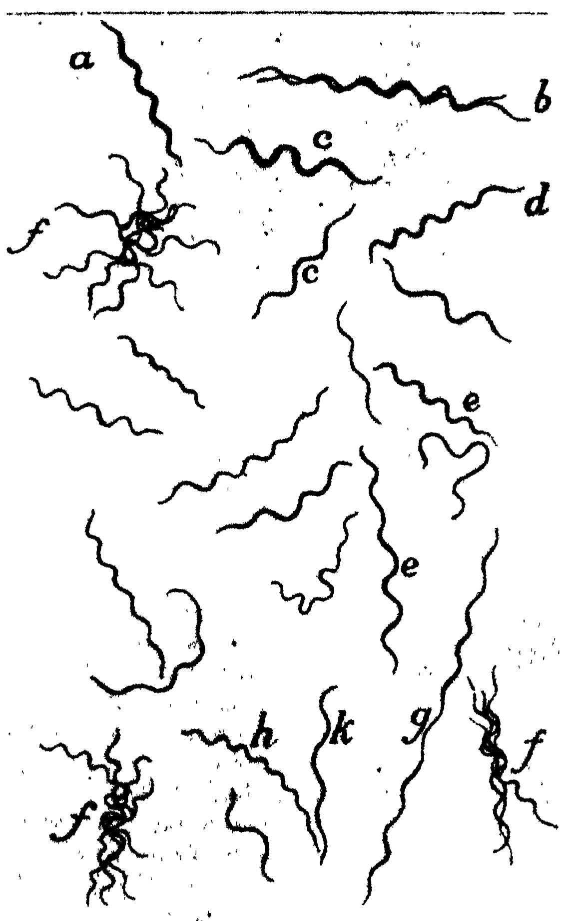
If a quart of wood-preserving oil (often known among poultrymen as "kerosene tar") is added to the emulsion in place of a quart of kerosene, it will be found more effective. The only objection to the wood-preserving oil is the soiling of the feathers of the white fowls.

Painting the roosts with wood-preserving oil can also be recommended as an additional preventive. The measures as above described are also most effective against ordinary hen lice.

The Fowl Tick and Spirochætosis.

Compiled by the Veterinary Officers of the Stock Branch under the authority of S. T. D. SYMONS, M.R.C.V.S., Chief Veterinary Officer.

THIS parasite referred to by Mr. Hadlington, which is known as a spirochæte, has been found affecting fowls in parts of Queensland, Victoria, and many other parts of the world, and it has long been suspected that a similar



Various forms of Fowl Spirochæte
(From the Third Report of the Wellcome Research Laboratories, Khartoum 1908.)

tick fever was present in some of the dry inland districts of New South Wales. Examination of the blood of fowls clinically affected has been made, and spirochætes were found to be present in large numbers. There is now little doubt that these parasites are prevalent in this State in many places where the ticks are found.

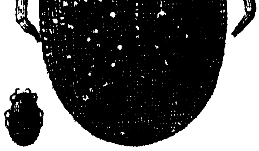
The spirochæte (*Spirochæta Marchouxi vel gallinarum*) when viewed under the microscope resembles a spiral or a corkscrew in shape, with both ends tapering. In length it varies somewhat, but in any case it is extremely minute. When fresh blood is examined, it is seen to be moving very actively among the corpuscles, which it lashes in all directions.

If blood is taken from a fowl suffering from spirochætosis and inoculated into a healthy fowl, the disease is produced, and in a few days parasites are found in the blood. The tick of course is the normal infecting agent, and the fowl can only become affected by inoculation by the tick. The parasites multiply rapidly in the blood, and later on are usually found collected into bundles or clumps. After this stage they usually disappear from the blood, though the bird may become weaker and die. If, however, it passes through this stage and recovers, it generally becomes immune to further attacks.

Post-mortem Appearances.

There is little to be seen. Usually the spleen is somewhat enlarged, and the liver congested, while examination of the blood shows changes due to anæmia. The parasite is difficult to discover in the blood after death.

Protective and Curative Treatment.



Fowl Tick (*Argas persicus*.) The smaller figure shows a specimen life size.

(From the Third Report of the Wellcome Research Laboratories, Khartoum, 1908.)

An attack of the disease renders the fowl immune, and inoculation of the serum from a bird that has recovered will protect a hitherto unaffected fowl from spirochætosis for a short period. Preparations of arsenic (atoxyl and soamin) have been found to have considerable curative properties.

From a practical point of view, however, neither artificial immunisation nor drug treatment compares with the institution of measures to eradicate ticks from the fowl run. These are the agents concerned in transmitting the spirochætes, and the ticks being destroyed, it follows that the fowls will be free from the disease. In short, the destruction of the tick removes the agent by which the disease is transmitted to the fowls.

Seasonable Work for Poultry-keepers.

APRIL.

JAMES HADLINGTON.

MOST of the work outlined for last month will still occupy the attention of poultry-keepers, more especially that relating to securing new stock. No time should now be lost in completing arrangements in this department. The success of the coming hatching season may depend much upon the dispositions made during the autumn months. The older roosters, whether segregated or not, should be occasionally looked over to see if they are keeping free from vermin. Should these undesirables be present, a dusting with equal parts of flowers of sulphur and ashes will be found an effective remedy. The hens, if provided with a dust bath, will usually keep themselves clean; but this is not the case with the roosters, which are apt to suffer through neglect in this respect to such an extent as to seriously undermine their health, and consequently render them unfit for service when wanted.

Many hens will now have finished moulting, and those it is intended to use as breeders should be drafted into the breeding pens and well looked after, with the object of inducing early laying. It is much better to get them settled in the pens than having to be moving them when the cold weather sets in. If the best results are to be obtained from second-year hens, warm housing is necessary. Many ways will be found of making their quarters snug and more comfortable for the winter than is necessary during the summer. No matter what system one is working upon, a little extra attention paid to the birds now will result in improving the winter egg production.

Roup.

A sharp look-out should be kept for any signs of roup among the young stock, which are particularly susceptible to it. Roup is more or less endemic in some places all the year round; but autumn conditions are particularly favourable to its development, and it sometimes plays great havoc Its contagious or infectious nature is admitted; but it is more dependent upon conditions than anything else, and it is not necessary to bring in an infected bird to start it. Scientific research into the nature and cause of this dread disease among poultry has established the fact that it is not caused by a specific microbe, but by a class of microbes; hence it is not possible, as in the case of diphtheria, to prepare a serum with which to combat it, although in many respects it is analogous to it, and is often designated diphtheric roup. At any rate no known success has been obtained by serum treatment so far, and roup still remains the most dreaded, because it is the most wide spread, disease of poultry.

There are three recognised kinds of this disease. The first, and most difficult to cure, is that affecting the head, with a putrid discharge from the nostrils, commencing like a catarrh, often spreading to the eye, which becomes swollen and filled with pus. Apparently the organisms penetrate the tissues, and make this form very difficult and often impossible to cure. The cases that do respond to treatment are mostly the stronger birds that are lightly affected. No internal medicine seems to have much effect upon it, and the main thing is to support the strength of the bird. Syringe out the nostrils and eyes twice or three times a day with either kerosene or a strong solution of permanganate of potash; while one grain of quinine may be given internally twice daily.

The second kind is what is known as Diphtheric Roup, and is very like the true diphtheria in man, and is recognised by a thick false membrane filling the throat and mouth. This is most deadly if left to itself, but is perhaps the most easily cured. Flowers of sulphur lightly dusted into the mouth and throat twice a day for two or three days will usually effect a cure.

The third variety is known among poultry men as "canker roup." This form is less prevalent, but attacks young and old alike. It has, however, a less debilitating effect upon the birds; in fact, they will often appear in the best of health. The symptoms of this form are gasping or often choking. Upon examination they will be found to have a cheesy-looking substance growing round the windpipe, and sometimes in the mouth. The effect of this is to grow to such an extent as to block up the air passage, causing suffocation. The remedy is to remove this substance with a bent piece of wire, taking care that none falls down the windpipe, also that it is not made to bleed. Afterwards dust very lightly with finely-powdered bluestone on the affected part, or make a paste of permanganate of potash crystals and paint the parts with it twice daily. These simple remedies will be found almost as effective as other more elaborate and less practicable ones. The point to emphasise is that, while many cases are of such a light nature that they will yield to treatment, the great bulk of cases will not be found to do so, especially the first-mentioned kind, when among late-hatched or debilitated stock. In these cases one has only to consider the amount of persistent effort and care necessary to pull through a human subject when attacked with diphtheria, to realise how utterly hopeless it is to attempt to cure the class of bird under notice. For fuller information upon the nature of this disease, see the results of investigation carried out at the Ontario Agricultural College and Experimental Farm, by Professor F. C. Harrison and Dr. H. Streit, referred to in Farmer's Bulletin, No. 15, issued by this Department, and obtainable on application.

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

Branch.	Honorary Secretary.
Albury	Mr. J. D. Lankester, Albury.
Baan Baa	Mr. P. Gilbert, Baan Baa.
Balldale	Mr. H. Elrington, Balldale.
Bathurst	Mr. J. McIntyre, Orton Park.
Batlow	Mr. A. C. Arnot, Batlow.
Beckom	Mr. S. Stinson, Beckom.
Bonville	Mr. H. B. Faviell, Bonville.
Borambil	Mr. H. A. D. Crossman, "Homewood," Quirindi.
Bungalong	Mr. G. H. Pereira, "Springdale," Cowra Road, *viâ* Cowra.
Canadian	Mr. C. Smith, Canadian Lead.
Cardiff	Mr. F. B. Cherry, Cardiff.
Carlingford	Mr. D. K. Otton, Carlingford.
Cattai	Mr. A. J. McDonald, Cattai, Pitt Town.
Collie	Mr. C. J. Rowcliff.
Coonabarabran	Dr. F. G. Failes, Coonabarabran.
Coradgery	Mr. J. Clatworthy, Beechmore, Millpose, Parkes.
Coreen-Burraja	Mr. N. B. Alston, Coreen, *viâ* Corowa.
Cowra	Mr. E. P. Todhunter, Cowra.
Crudine	Mr. F. W. Clarke, Crudine.
Cundletown	Mr. S. A. Levick, Roseneath, Cundletown.
Deniliquin	Mr. W. J. Adams, jun., Deniliquin.
Derrain	Mr. A. P. Hunter, Red Bank Creek, Matong.
Dubbo	Mr. T. A. Nicholas, Dubbo.
Dunedoo	Mr. G. E. Alexander, Dunedoo.
Erudgere	Mr. Frank Hughes, Erudgere.
Fernbrook	Mr. W. Marks, Yarrum Creek, Dorrigo.
Forest Creek	Mr. W. Thompson, Forest Creek, Frogmore.
Garra and Pinecliff ...	Mr. A. S. Blackwood, "Netherton," Garra, *viâ* Pinecliff.
Gerringong	Mr. J. Miller, Gerringong.
Grenfell	Mr. G. Cousins, Grenfell.
Gunning	Mr. E. H. Turner, Gunning.
Henty	Mr. H. W. Smith, Henty.
Hillston	Mr. M. Knechtli, Hillston.
Inverell	Mr. W. A. Kook, Rock Mount, Inverell.
Jerrara	Mr. A. O. Lane, Public School, Mullengrove, Wheeo.
Jiggi	Mr. D. Gibson, Daru Farm, Jiggi.
Jindabyne	Mr. Sylvester Kennedy, Jindabyne.
Katoomba	Mr. C. Wooller, Oliva Park Farm, Katoomba
Keepit, Manilla	Mr. J. B. Fitzgerald, Keepit, *viâ* Manilla.
Kellyville	Mr. Joseph Nutter, Kellyville.
Kenthurst	Mr. J. R. Jones, Kenthurst.
Leech's Gully	Mr. J. Donnelly, Leech's Gully, Tenterfield.
Leeton	Mr. C. Ledwidge, Farm 442, Leeton.
Little Plain	Mr. F. S. Stening, Little Plain, *viâ* Inverell.
Lower Portland	Mr. W. C. Gambrill, Lower Portland.
Mangrove Mountain ..	Mr. G. T. Hunt, Mangrove Mountain, *viâ* Gosford.
Martin's Creek	Mr. P. Laney, Martin's Creek, *viâ* Paterson.
Meadow Flat	Mr. F. J. Brown, "The Poplars," Meadow Flat, *viâ* Rydal.
Middle Dural	Mr. J. W. Thacker (*pro tem*), Middle Dural.
Milbrulong	Mr. O. Ludwig, Milbrulong.
Moruya	Mr. P. Flynn, Moruya.
Narellan	Mr. G. J. Richardson, Narellan.
Narrandera	Mr. C. F. Pearce, Narrandera.
Nelson's Plains	Mr. V. Schlaadt, Nelson's Plains
New Italy	Mr. F. A. Morandini, New Italy.
Nimbin	Mr. J. H. Hutchinson, Nimbin.
Orangeville	Mr. C. Duck, Orangeville, The Oaks.
Orchard Hills (Penrith) ...	Mr. H. Basedow, Orchard Hills, *viâ* Penrith.

Branch.	Honorary Secretary.
Parkesbourne	Mr. W. H. Weatherstone, Parkesbourne.
Peak Hill	Mr. A. B. Pettigrew, Peak Hill.
Penrose-Kareela	Mr. A. J. Bennett, "Brookvale," Kareela.
Ponto	Mr. A. D. Dunkley, Ponto.
Redbank	Mr. J. A. Graham, Woodlands, McAlister, *viâ* Goulburn.
Ringwood	Mr. Wm. Tait, Ringwood.
St. Mary's	Mr. W. Morris, Queen and Victoria Streets, St. Mary's.
Sackville	Mr. Arthur Manning, Sackville.
Sherwood	Mr. J. E. Davis, Sherwood.
Stockinbingal	Mr. J. Neville, Stockinbingal
St. John's Park	Mr. J. C. Scott, St. John's Park.
Tallawang	Mr. J. E. Hansall, Tallawang.
Taralga	Mr. Dave Mullaney, Stonequarry, Taralga.
Toronto	Mr. J. G. Desreaux, Esmond, Toronto.
Tumbarumba	Mr. R. Livingstone, Tumbarumba.
Upper Belmore River ..	Mr. A. W. Fowler, Upper Belmore River, *viâ* Gladstone, Macleay River.
Uralla	Mr. E. A. Neil, Uralla.
Wagga	Mr. Thos. Fraser, Aberfeldie, Wagga.
Walla Walla	Mr. H. Smith, Walla Walla.
Wallendbeen	Mr. W. J. Cartwright, Wallendbeen.
Walli	Mr. A. V. Bloomfield, Walli.
Wetherill Park	Mr. L. Rainbow, Wetherill Park.
Wollun	Mr. C. E. Burke, Private Bag, Wollun.
Wolseley Park	Mr. H. McEachern, Wolseley Park.
Wyan	Mr. C. W. Harper, Myrtle Creek Railway Station
Wyong	Mr. Edgar J. Johns, Wyong.
Yass	Mr. Cyril Ferris, Yass.

Notice to Honorary Secretaries.

It is important that a record of the meetings of the branches should be inserted in the *Agricultural Gazette*, and honorary secretaries are invited to forward to the Department a short account of the proceedings of each meeting, with a brief summary of any paper which may have been read, and the discussion that followed it, as early as possible after each meeting. Notes for insertion in the *Agricultural Gazette* must reach the Department before the 16th to ensure insertion in the following month's issue.

Insect Pests.—Quite a number of the branches have availed themselves of the Department's offer to supply a set of insects, being the common pests of the district, and the collections are now being cased. The Government Entomologist suggests that as each district has certain pests peculiar to its orchards and gardens, more useful work would be done if the members themselves collected the local pests (orchard, garden, and stock) and sent them to the Department, where they would be arranged, mounted, a descriptive label attached, and returned to the branch. Mr. Froggatt considers that such a collection would have a far greater value, as there would be more interest attached to the specimens when the members knew exactly where the pests came from, and where and how to find them.

Demonstrations in Clearing Land and Subsoiling with Explosives.

Demonstrations in clearing land and subsoiling with explosives will be given by Mr. H. C. Coggins, Assistant Inspector of Agriculture, to branches of the Agricultural Bureau. Branches who wish to take advantage of this offer are requested to make early application to the Department through their honorary secretaries

Veterinary Lectures.

In connection with the lectures to branches of the Agricultural Bureau, it is herewith pointed out for the information of honorary secretaries that the following is the list of subjects of lectures which can be delivered to them :—

Horses.—(1) Conformation and Unsoundness (with lantern illustrations); (2) Colic and Treatment of Wounds; (3) Strangles, Influenza, and Tetanus.

Cattle.—(1) Tuberculosis (with lantern illustrations); (2) Contagious Abortion and Contagious Mammitis; (3) Ticks, Tick Fever, Tick Infestation and Eradication.

Sheep.—Parasitic Diseases of Sheep.

Pigs.—Diseases of Pigs.

General.—(1) Parturition of Farm Animals (with lantern illustrations); (2) Feeding of Farm Animals and Dietetic Diseases; (3) Sterility: Causes and Treatment in all classes of Stock.

Bee-keeping.

A series of lectures on bee-keeping is being arranged by Mr. R. G. Warry, Instructor in Apiculture. Secretaries, whose branches intend availing themselves of this opportunity to receive a practical insight into this branch of agriculture, are requested to make early application.

REPORTS AND NOTICES FROM BRANCHES.

Albury.

Mr. Blunno, Viticultural Expert, lectured on 12th February at Thurgoona, dealing with the subject of vinification from the aspects of cleanliness in the various operations of making wine, proper fermentation, and the chemical composition of the grape juice for producing wines of better quality.

Vinification

In the matter of cleanliness, Mr. Blunno warned vignerons that from this year on, an inspector under the Pure Foods Act would visit the cellars to see that the general conditions of cleanliness were adhered to. There was a belief among many vignerons that no matter what became dissolved in the grape juice it was thrown out afterwards in the process of fermentation. This was not correct, as what was soluble in the grape juice was more soluble in wine, because alcohol was a better solvent than water. As to the chemical composition of grapes, in some vintages, and towards the end of a vintage, the grapes became deficient in acids, with the result that the yeast fermented under disadvantageous conditions. Grape juice should contain from 6·5 to 7·5 parts of tartaric acidity per 1,000 parts of juice. When the acidity was below 6·5 it was advisable to correct it by adding either tartaric acid or citric acid. If tartaric acid were used, one pound would raise by one point the acidity of 100 gallons of must. If citric acid were used, a less quantity would be required, because it was stronger than tartaric acid. One part of tartaric acid was equal to ·93 citric acid. As to proper fermentation, grape sugar under the influence of yeast split up into alcohol and carbonic acid, and produced heat. One gramme of sugar raised 100 cubic centimetres of must by 2·3 deg (Fahr.). Therefore grape juice which contained 24 per cent. of sugar would produce, during fermentation, 56 degrees, which must be added to the initial temperature of the must. Suppose, for instance, that the grape juice when flowing from the crusher was 75 degrees, the temperature would then be increased to 131 degrees. Usually, during fermentation, the juice did not reach that degree of heat, because there was a loss of heat through radiation. If, however, the wine-maker was not very careful, his grape juice would become hot enough to spoil the resulting wine. To keep the temperature within limits, the grower should adopt some devices. To begin with, the ideal temperature of fermentation was about 86 degrees. But good wines may be produced at 90 degrees. He recommended, as means that were accessible to most vignerons, to prevent the accumulation of heat, the employment of small fermenting vats. Small vessels have

relatively a larger radiating surface than larger ones. He also recommended the use of fermenting vats made of cement—on the Monier system. They should pick the grapes early in the morning so as to have them cool for crushing, and, therefore, at a lower initial temperature. If grapes were picked during the heat of the day, it would be advisable to spread them on canvas over night. If grapes were brought in hot, it was advisable to split the crop into small lots, and to put each into different fermenting vessels. There was a belief among vignerons that once a vat was full of juice it should not be interfered with; but that was a fallacy. In fact, if the juice became too hot in some vats, it could be cooled by taking a quantity out, and adding a quantity of must made from cool grapes. Another means of cooling the juice was to have coils in the vats, through which cold water could be run. But very few vignerons had a sufficient quantity of cold water to adopt that system. Mr. Blunno next dealt with the new method of adding to the fermenting must metabisulphite of potassium, which he has advocated since 1901.

Batlow.

On 4th February Mr. H. C. Coggins, Assistant Inspector of Agriculture, gave a very successful demonstration of the use of explosives in clearing, splitting, subsoiling, and post-hole blowing.

On 17th February the Assistant Fruit Expert, Mr. J. G. R. Bryant, gave a very thorough and well attended lecture and demonstration on packing at the orchards of Messrs. Bucknell and Cabban. He used the numerical diagonal pack. Mr. Bryant advised growers to go to some trouble with the get-up of their fruit, as they would always be compensated by the enhanced prices.

CORRECTION.—In the January issue of the *Gazette*, in a report of a paper delivered at Batlow by Mr. A. C. Arnot, it was stated that "A method of keeping down the moth which seems to promise well has been discovered by the Principal of the Burnley Horticultural Gardens, Victoria. He hangs a bottle containing some preparation in the tree, and the moth is attracted and killed by it." Mr. E. E. Pescott, the Principal of the School of Horticulture, Burnley, informs us that he did not discover this preparation, nor is he now using it in the Burnley orchards.

Borambil.

The usual monthly meeting of this branch took place on 11th February. Mr. F. Ditzell, Assistant Inspector of Agriculture, was present.

CHAFF *v.* GRAIN FOR PROFIT.

Mr. H. A. D. CROSSMAN read a brief paper on the subject of chaff *v.* wheat (grain), giving figures to show that, taking an average crop of 18 bushels of wheat at 3s. 1d., and 30 cwt. of chaff at 4s. per cwt., which was the current selling price locally, a gross return of £2 15s. 6d. was obtained for wheat, and £6 for chaff per acre. The expenses on the produce delivered in Quirindi were set down at, wheat 18s. 6d., and chaff £2 11s. 6d. per acre, a net return of £1 17s. per acre being left on wheat, and £3 8s. 6d. per acre on chaff.

The expenses were estimated as follow:—

Wheat per acre.

	£	s.	d.
Harvesting at 10s. per acre	0	10	0
6 bags at 8s. per dozen ..	0	4	0
Cartage, 4 miles at 6d. per bag	0	3	6
Bag sewing and twine ..	0	1	0
	£0	18	6

Chaff per acre.

	£	s.	d.
Reaper and binder	0	5	0
Twine	0	2	0
Stooking	0	2	0
Carting to stack	0	2	0
Chaff cutter—1½ tons at 10s. per ton	0	15	0
2¾ doz. bags at 6s. per doz...	0	16	6
Cartage, 4 miles at 6s. per ton	0	9	0
	£2	11	6

After a general discussion, Mr. DITZELL, by request, criticised what Mr. Crossman had said. He thought that the average crops taken were high, as results at the Experiment Farms and the average for the whole district were both lower; the price for chaff was also too high. He thought chaff was only better when close to rail, and if the farmer had his own plant.

Mr. Ditzell also answered several questions on the varieties of wheat, &c.

Canadian.

There was a good attendance at the usual monthly meeting of this branch held on Saturday, 14th February.

A lengthy discussion took place on the cause of white tipped heads in wheat. It was finally concluded that the cause was lack of moisture, accompanied by late frosts and hot winds.

Collie.

A very large and representative gathering of farmers and settlers took place at Collie on 6th February, the occasion being a lecture and lantern demonstration by Mr. Birks, B.Sc., Inspector of Agriculture. A number of ladies were present.

Mr. S. K. Murray occupied the chair and introduced the speaker, and explained the nature of the lecture.

DRY FARMING.

Mr. BIRKS said the term "Dry Farming" was derived from America, and referred to that branch or class of farming which enables the farmer to grow profitable crops under droughty conditions. Fallowing was the initial step to success, and he had been pleased to note on his journey out to Collie that some were practising fallowing. The preparation of the soil should commence with discing in January, 1914, for the crop to be planted in autumn, 1915. This discing opened up the ground and cleaned it of all rubbish and weeds, and allowed any summer rain to sink into the ground. In June or July, ploughing, which is the most important part in the production of a successful crop, should begin. One of the main features in ploughing is to plough a good depth, say 5 or 6 inches, in order to turn up sufficient loose soil to allow the winter rain to thoroughly soak into the subsoil. In September the late ploughed ground should be knocked down with the harrow or sub-packer. By the end of September the weeds would begin to show, and must be eradicated by means of a cultivator to loosen the top of the ground. Should there be any very hard patches, some heavy implement must be used, and the speaker favoured a one-way disc, skim plough, or scarifier cultivator. By the end of October all ground should be broken up, and during summer the land must be kept loose and free from all weeds and foreign grasses. A necessary cultivation is the November one, the object being to eradicate all summer growth, but the working may be lighter than any previous one, using a spring-tooth cultivator, but under no consideration a disc, as the surface must not be too fine. It is very essential to have ground in good condition previous to drilling in April and May. The drill should always be immediately preceded by the cultivator, from 2 to 3 inches deep, the grain being sown at the same depth.

He also favoured experimenting with superphosphate, as in most districts it was beneficial in giving the wheat a quick and strong start.

The harrows should be run over the growing crop perhaps two or three times after heavy rains to keep the surface loose until the wheat is 9 or 12 inches high. The practice of grazing sheep on the farm was strongly urged, and a great future for the country by combining wheat, mutton, and wool was predicted.

The varieties of wheat most suitable for different districts were very fully explained. It was most essential to select quick growing, hardy wheats for dry districts, such as Bunyip, Firbank, Thew, Florence, &c.

Several experiments were conducted during the lecture. The first phenomenon to which attention was drawn was the curved surface of water at its edge in an ordinary clean tumbler. The surface of the glass exercises a mysterious attractive force on the water at its surface, and is able to draw it up very slightly. The bulk of water, however, is so large that the "pull" does not affect it greatly. If, however, this bulk be greatly reduced (by bringing another surface of glass into close proximity), the pull is doubled (each surface of glass having the same effect) while the amount of water between can be made as small as desired. When the glasses are close enough, therefore, the attraction of their surfaces is sufficient to draw the water up between them. This was illustrated by two sheets of glass placed face to face and separated at one end by a small chip of wood (about 1-16th of an inch thick), and clamped closely together at the other end. The glasses were placed vertically, with their bottom edge dipped into a trough of water. At the end where the glasses were separated, the water rose between them about ¼ of an inch, whereas, towards the other end it rose higher and higher until at the point where the clamps held the glasses in close contact, the water rose to the full height of the glass, about 4 inches. The same thing was shown in a series of tubes of small bore. Commencing with one about 1-10th of an inch in diameter, the rise was scarcely perceptible, but it increased in tubes of smaller bore until in a very finely drawn "capillary" the water stood at about 5 inches. The principle was that when the amount of surface was large in proportion to the quantity of water to be raised the water rose in proportion. If the coarse tube mentioned above were filled with fine sand, it would, by filling up a certain amount of space, reduce the volume of water to be raised, and at the same time the amount of surface would be greatly increased as each small particle of sand had a large surface in proportion to its bulk. The pulling power was thus greatly increased while the amount of water was reduced. The water would therefore rise to a very much greater height, and further, the finer the sand the greater the amount of surface. This gave greater pulling power, and therefore a greater use of water. This was illustrated by a series of seven tubes, filled respectively with sand of the following approximate sizes:—One-tenth, one-twentieth, one-thirtieth, one-fortieth, one-sixtieth, one-eightieth, and one-one hundredth of an inch. These were all placed vertically with their bottom ends dipping into a trough of water. The rise was only half in the coarse sand, and gradually increased in the other tubes until in the sand of 1-100th inch diameter the water stood at about 12 inches. The coarse sand was supposed to represent loose, well-cultivated soil, while the action in the fine sand was that occurring in the same soil uncultured, or after it had been set down by rain. The experiment was repeated with an actual sample of soil. In its coarse, open condition the water rose about ½ of an inch, but in the same soil pulverized and compressed in the tube, the water quickly rose to 5 inches. This rise of water in consolidated soil was, of course, precisely what the working of fallow was meant to prevent. How effectively this might be done by loosening the surface was shown in another pair of tubes. One was filled with fine sand to a height of 7 inches, and the other with 4 inches of the same sand covered by a 3-inch layer of loose, open soil. In the first, the water quickly rose to the surface, while in the other its rise was stopped short by the loose earth. In one the soil moisture would in practice be exposed to the evaporating influences of sun and air; in the other it would be protected from both by the covering layer of loose earth.

The cost of the various workings under the system of cultivation advocated would be, discing at 2s. 3d., ploughing 6s., harrowing 9d., cultivating 2s. 3d., second harrowing 9d., second cultivation 1s. 9d.; during summer about two more cultivations at 2s. each, cultivating prior to drill and harrowing 2s. 9d., making a sum of £1 0s. 6d., plus 5s. for the extra year's rent; total, £1 5s. 6d. per acre on the preparation of the ground.

In the ordinary way of putting in a crop on raw ground, the cost would be, ploughing 7s. 6d., cultivating 2s., harrowing 9d.; total, 10s. 3d. Therefore, the fallowed land cost 15s. 3d. more per acre to prepare, representing 1½ bags of wheat. In a run of normal seasons the increased return on fallowed land should be nothing less than three bags per acre on the average, and in a dry year, when a "slammed in" crop would give no return, a fallowed crop

might be depended on for a fair yield, and this alone justified the extra cost of fallowing for a number of years, together with the fact that a healthier sample of wheat would be obtained. A number of very convincing instances of good crops grown on low rainfall on Government farms and experiment plots in the State were cited. A 30-cwt. average of hay was got at Nyngan on 8 inches of rain, 4½ inches falling prior to June, and six and seven bags of wheat at Mungeribar on a similar fall. In this case the crop did not receive as much as half an inch of rain in any one fall during the last four months of growth. These and other examples showed clearly that as long as plenty of moisture was stored in the subsoil, a good crop of wheat could be grown with very little extra rain actually falling on it. The roots of wheat went down 4 or 5 feet in a good free soil in a dry district. In this mass of earth, even if it was only just perceptibly moist, there would be stored moisture equal to 10, 12, or even 15 inches of rain. Further, if an inch of rain should fall on well-worked ground in the summer, at least half of it could be retained by further working, and finally in actual cases it had been found that during summer the soil in fallow contained twice as much moisture (or more) as neglected ground.

Mr. T. J. Nash moved a vote of thanks to Mr. Birks for the very able and instructive demonstration he had given, and this was carried with great applause.

Coonabarabran.

The usual monthly meeting of the branch was held on 7th February, with a fair attendance of members.

Local Experiment Plots.

A report was submitted by Mr. W. R. Woods on the experiments with wheat carried out at Yerinan. The experiments were conducted on land previously cropped with wheat which had not been manured; the mould-board plough was used, depth 5 inches, ploughed twice. Sowing was done by hand, the seed being ungraded seed which had been pickled in a bluestone solution. Marshall's No. 3 was sown on 2nd May, at the rate of 65 lb. per acre, Federation on 20th June, at 60 lb. per acre, and Bunyip on 26th June, at 60 lb. per acre. The crops were harrowed immediately after sowing, but not fed-off. The rainfall for the year totalled 2,556 points, made up thus:—January, 104; February, 295; March, 447; April, 395; May, 424; June, 240; July, 84; August, 50; September, 97; October, 153; November, 71; December, 196. The Marshall's No. 3 yielded hay at the rate of 2¼ tons per acre, and being harvested for grain on 18th to 21st November, gave 25 bushels; Federation, harvested 2nd and 3rd December, gave 14½ bushels; and Bunyip, harvested 25th and 26th December, gave 8 bushels. Marshall's No. 3 proved the most suitable variety for the district for both hay and grain.

Mr. A. R. Moss reported on experiments conducted at his farm "Rippondale." The land was poor sandy soil, ploughed 4 inches deep, and not otherwise treated till sowing, when unpickled seed supplied by the Department was sown in drills 8 inches apart, 2 inches deep, and 6 inches apart in the drills. The plots, which varied from 1 to 20 square yards, according to the quantity of seed supplied, were hand reaped and threshed as they ripened, the yields being at the following rates per acre:—Bunyip, 16 bushels 24 lb.; Bobs, 13 bushels 51 lb; Warren, 11 bushels 50 lb.; John Brown, 11 bushels 49 lb.; Florence, 9 bushels 33 lb.; Steinwedel, 8 bushels 36 lb.; Bayah, 8 bushels 21 lb.; Bomen, 8 bushels 11 lb.; Thew, 6 bushels 43 lb.; Genoa, 4 bushels 19 lb.; Yandilla King, 4 bushels 5 lb.; Cleveland, 3 bushels 55 lb.; Marshall's No. 3, 3 bushels 46 lb.; Cedar, 3 bushels 29 lb.; Comeback, 3 bushels 9 lb.; Firbank, 2 bushels 56 lb.; Federation, 2 bushels 27 lb.; Zealand, 1 bushel 15 lb. Cedar and Federation were sown on the 16th July, and the other varieties on the 20th July or 1st August. Cedar was sown for irrigation on 20th April, irrigated four times, cut down in July, and reaped in December, yielding 42 bushels 59 lb. The rainfall between 14th May and 12th November was 13¼ inches.

Dr. Failes and Mr. Wood supported the report as showing that late sowings (more especially of the slow-growing varieties) were a failure.

DEPARTMENTAL NOTE.—It is pointed out that results obtained from such small plots, and from single trials, are apt to be very misleading. Our experience shows that to obtain reliable figures it is necessary to have a number of trials on a fairly large scale, and to take an average of the same. In a dry season like that experienced last year, the bad effect of late planting is more marked than in an ordinary year, and as the varieties referred to were sown altogether too late, the results cannot be taken as a fair index of what these varieties would produce in this district under better conditions.

It was decided that the branch devote £2 2s. towards a prize for best judgment by points, in the draught horse and farm produce sections at the district show, open to any youth under 18 years of age.

Subjects for discussion at next meeting:—The establishment of an experiment farm in this district; judging of stock in the show ring by junior judges.

Henty.

At the meeting of this branch on 14th February, a paper on "Co-operation" was read by the Chairman, Mr. P. W. Smart. Extracts from this paper will be published in our next issue.

Hillston.

The ordinary meeting of the above branch was held on 14th February.

Mr. Morant asked if any of the members could tell him of a preventive for cabbage aphis. His last crop had been completely destroyed by the pest.

Mr. Seton stated that last year his cabbages were comparatively free, but in previous years they had been badly affected.

Mr. Cashmere said the pumpkin bettle was proving very destructive this season, and he would like to know of a remedy.

It was decided that the secretary should write to the Department with regard to these matters.

Mr. W. Cashmere contributed the following paper:—

FLAG SMUT.

Last season was my first experience with flag smut, so I cannot say I know much about it, except that it reduces the wheat yield considerably. In my case I should say the loss was quite 5 bushels to the acre. About one-third of the plants in the crop where the disease appeared were affected. All the affected crop was grown on fallowed land, which was ploughed between the 1st August and 15th September, 1912. The fallow was worked three times with the spring-tooth cultivator during the following summer, and sown by the drill, with an average of 30 lb. of manure to the acre.

The land where the straw of the previous crop was ploughed in was affected more than where the straw had been burnt, so it was possible that the disease had been ploughed in with the straw, or that the presence of the straw conduced to its development.

It was a very dry period from the 1st of August to the middle of October, while the crop was growing, but this would not have much weight with me, as we have had dry times before, but this is the first time flag smut has appeared in my crop.

Federation wheat was affected more than any other variety. The following wheats were grown in the same paddock under the same conditions:—Federation, Defiance, Bobs, Dart's Imperial, and Firbank. Of these, Federation was most affected by the disease, and Firbank the least.

The disease first made its appearance when the crop was commencing to come out in ear, when the affected plants had a withered appearance. The grain when harvested was a good, plump sample, weighing well, and quite free from the ordinary smut.

I would like to see other branches take the matter up, and give their views.

DISCUSSION.—Mr. MORANT asked if it were possible that the quantity of manure used caused the disease, as too much manure often made the crop too rank, and in a dry, hot period it withered off?

Mr. CASHMERE did not think so. The portion of the crop that was least affected got most moisture.

Mr. RANKEN asked if he thought the seed used was responsible?

Mr. CASHMERE did not think so. Different varieties of seed were used. It was the first time he had seen the disease. Bluestone did not seem any use as a preventive. It was possible that the disease was not the same as the grain smut, but the flag went black and withered up, and had the same appearance as grain smut. He was inclined to think that the fact of the straw being ploughed in had something to do with the appearance of the disease.

Mr. T. WEAVER said his crop was also affected with the disease, and it had made a considerable difference in the yield.

It was pointed out that it was a serious matter, as it affected the wheat yield considerably, and it was decided to send some of the affected plants to the Department for information.

Leeton.

A meeting of this branch was held on 17th January, when a paper on "Vegetable Growing" was read by Mr. C. Braithwaite.

On 6th February, Mr. G. H. Bassett delivered a short lecture on "Bee Culture," which was listened to with interest. A report of this lecture will appear in the next issue.

Meadow Flat.

A new branch has been established at Meadow Flat, with the following gentlemen as office-bearers:—Chairman, Mr. A. J. Brown; Vice-Chairmen, Messrs. J. Murray, W. McAlister, G. Green, and C. Scott; Treasurer, Mr H. E. Brown; Hon. Secretary, Mr. F. J. Brown.

There are twenty members to commence with, and the annual subscription has been fixed at 1s.

Orangeville.

It is the custom of this branch to discuss at each meeting the farm, orchard, and vegetable garden operations for the month following. This has proved a great help to quite a number of members, and the example might be copied with advantage by other branches.

After a good discussion at the February meeting as to when the sowing of oats could be commenced for hay purposes, it was agreed that the middle of February was not too early for Algerian oats.

Mr. W. H. DUNK read a paper dealing with waste products on the farm, and how they could be put to a profitable use. In the course of his paper he said that last year he had a good many small pumpkins, potatoes, turnips, cabbage leaves, &c. These things were of no market value, so he decided to purchase a pig. At the end of September, 1912, he bought a cross-bred sow and seven little ones about a month old, for the sum of £3 2s. 6d. In one month from the date of purchase he sold the little ones for £5 5s. The following April he sold ten more suckers for £5, and again in October ten more, all from the one sow, for the sum of £9 18s. 6d. Thus, in about twelve months, he sold suckers to the value of £20 3s. 6d., and he still has the sow, which he values at £3.

The only expense he incurred was the purchase of two bags of pollard at a cost of 16s., the rest of the money having been made from unmarketable products.

Taralga.

There was a good attendance at the usual monthly meeting of this branch on 9th February.

Several members reported having been successful in poisoning parrots.

A very interesting scientific paper on "Mendelism" was read by Mr. Twynam.

Uralla.

A party of members of the above branch visited the Glen Innes Experiment Farm on Thursday, 19th February. The secretary reports that the visit was most enjoyable and instructive.

Wollun.

On 17th February one of the Department's Veterinary Officers, Mr. H. O. Oliver, M.R.C.V.S., visited Wollun under the auspices of the local branch of the Bureau. There was a large attendance of members and stock-owners to meet the officer.

Mr. Oliver commenced the afternoon's instruction by demonstrating on a cow the method of testing for tuberculosis, giving some highly valuable information concerning the disease.

A demonstration of a method of castrating a colt in a standing position, without the aid of a rope, was next given. The operation, which was entirely new to stock-owners in the North, had been the subject of much conjecture but it was performed on a rather restive colt in a skilful manner that appeared simpler than could be imagined. Several members successfully carried out the operation on other colts present, and one and all expressed themselves delighted at the knowledge obtained.

Mr. Oliver was kept exceedingly busy for the next few hours dealing with all manner of ailments in animals which were presented for inspection.

On the same evening, at 8 o'clock, in Wollun Homestead, a lantern lecture on "Conformation and unsoundness in horses" was largely attended. At the conclusion of the lecture members were given several useful prescriptions for ointments, and doses for various troubles in stock.

Mr. C. E. Burke, on behalf of the members of the branch and stock-owners who were present, thanked Mr. Oliver for his highly interesting instruction, and in doing so congratulated the members of the branch on the enthusiasm shown in its doings. The motion was carried with acclamation.

Eradicating Sorrel.

In reply to an inquiry by the Secretary regarding the method of eradicating sorrel, the Department advised as follows:—"Sorrel can be eradicated by liming and cultivation. So far, the best remedy found is lime. Generally, applications of lime from 5 cwt. to 1 ton per acre will kill out and keep down sorrel, as well as benefit the soil in other ways. Crops can be sown on the land from a month to two months after it has been limed. On no account should the sorrel plants be allowed to seed. The best way is to plough, exposing the roots to the frosts during winter, and then plough in the spring and sow a strong growing fodder plant to smother out the sorrel.

"If sorrel between the fruit-trees is very bad, it will be found that there is no crop which will choke it out, and the first consideration before sowing any crop must be to get rid of the sorrel."

Orchard Notes.

W J. ALLEN.

APRIL.

Harvesting.

THE work of picking, packing, and marketing apples and pears will still continue this month. The late varieties are mostly good keepers, but in picking and handling care should be used not to bruise the fruit in any way as a bruised fruit will not keep. For long keeping the fruit should be picked in the cool part of the day and stored away in a dry, cool, and well ventilated shed. When picking, the stem should be left intact, as this prevents injurious fungi entering the fruit and setting up moulds and rot.

Green Manuring.

The soil in most of our fruit centres has received a good soaking, so that wherever it is intended to sow a crop for green manuring the seed should be planted without delay. Such crops may be either leguminous or non leguminous. The former comprise grey field peas, vetches, &c., whereas of the non-leguminous crops, barley, rye, and rape may be found useful. Combinations of vetches and barley, peas and barley, &c., are often found to make a good stand of greenstuff for ploughing in.

Planting.

Planting of citrus trees may be carried on this month. The autumn is a very suitable time for planting citrus trees in districts where frosts are not likely to injure the trees. Care should be taken to have the trees placed in the ground as quickly as possible after being lifted from the nursery. Exposure of the roots to sun and wind materially influences their future vigour.

The preparation of new ground for planting should now be undertaken. The recent rains have made clearing possible, and the necessary ploughing and subsoiling should receive adequate attention.

No delay should be made in ordering fruit trees for the season's planting. Intending planters are invited to consult the Department in connection with the selection of varieties. A look around the principal nurseries should give an idea of the class of trees available. Late ordering generally results in securing the less desirable. For apples, be sure to order the trees on blight-proof stocks, as trees worked on such stocks will not be affected by woolly aphis on the roots.

Refills.

It is always a more or less difficult matter to secure a good start with young trees in an established orchard from which some old ones have been

removed. To encourage and assist the young trees to make headway, the land should be broken up now, and where the soil is at all poor, a load of fresh soil should be added and mixed in the hole where the young tree is to be planted.

Scales on Citrus Fruits.

Fumigating or spraying for scale insects, if not already carried out, should not be allowed to remain neglected. Dirty fruit is a drug on the market at any time. The interstate buyers are particularly averse to purchasing scaly fruit, whether the scale is dead or alive. Only clean fruit is allowed to be marketed in New Zealand and the different States of the Commonwealth. Fumigation leaflets and information on spraying can be had upon application to the Department.

Codlin Moth.

The placing of bandages on the apple and pear trees at the present time is a good means of catching stray Codlin grubs which are settling down for their winter period of rest. Any grubs killed at this time of the year tend to materially reduce the infestation next spring. Old rough bark and broken limbs should be examined for larvæ and pupæ of this destructive moth.

Improvements.

This month is usually a slack one in deciduous and citrus orchards Advantage should be taken to effect improvements and to do some of the numerous "odd jobs" that always await the enterprising orchardist.

Carting and spreading manure and soil might be carried out. Fences and buildings can be put in thorough repair. The cleaning, painting, and sharpening of implements and tools can be attended to on wet days.

One operation that is of value, although expensive in its adoption, is drainage. A small area laid down with tile-drains is a splendid investment, more especially in the heavier and shallower citrus soils of the coast.

Specimens of Fruit.

I have to acknowledge with thanks the receipt of splendid samples of apples from Mr. A. C. Brown, Goondarin Creek, Mount Keira. The colour and quality is of the best, and certainly shows the suitability of the climate and soil in this locality for apple culture

Mr. W. E. West, "Carnarvon," Canoblas, *via* Orange, forwarded me some beautiful samples of Pond's Seedling and President Plums. There can be no doubt that the European varieties of plums are well suited to the climate of the Orange district.

Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull.	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn ...	Imperialist ...	Florio	Lady Nancy of Minembah	Berry Farm ...	*
Jersey ..	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Cowra Farm ..	*
" ..	Thessalian II. ..	Thessalian (imp.).	Egyptian Princess (imp.).	Wagga Farm	*
" ...	Trafalgar ...	Best Man	Rum Omelette	Wagga Farm ..	*
" ..	Kaid of Khartoum	Sir Jack ...	Egyptian Belle	H. A. College	*
" ..	Bridegroom .	Best Man .	Golden Omelette	Yanco Farm .	*
Guernsey ..	The King's Mirror	Calm Prince ..	Vivid (imp.) .	Kyogle	4 July, '14.
" ..	Star Prince ...	Calm Prince ..	Vivid (imp.) ..	Casino . ..	— Sept., '14.
" ...	Sky Pilot ...	Prince Souvia .	Parson's Red Rose (imp.)	Maclean ...	11 July, '14.
" ...	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (6509)	Inverell	5 April, '14.
" ...	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	*
" ...	Claudius (imp.)	Golden Star II..	Claudia's Pride (imp.).	Wollongbar Farm	†
" ..	Trengwainton Village Favourite (imp.)	Trengwainton Village Lad	Wild Eyes .	Wollongbar Farm	*
" .	George III	King of the Roses	Calm 2nd .	Berry Farm	†
" ...	The Peacemaker	Calm Prince ...	Rose Petersen	Scone ...	2 July, '14.
" ...	King of the Roses	Hayes' King .	Rosey 8th (im.)	Bega ...	20 June, '14
" ...	Lauderlad ...	Laura's Boy ..	Souvenir of Wollongbar	Casino	— Sept., '14.
" ...	Belfast	King of the Roses	Flaxy 2nd ...	Grafton Farm .	†
" ...	Royal Preel ...	Itchen Royal ...	Hayes' Lily du Preel (imp.).	Murwillumbah ..	31 May, '14.
" ...	Prince of Warren Wood (imp.).	Kingsmoor Governor (1952)	Quail (7051)	Berry Farm ...	*
" ...	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Fredericktou ..	— Sept., '14.
" ...	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	Paterson-Vacy .	9 Sept., '14.
Ayrshire ...	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose...	Grafton Farm .	*
" ...	Orphan Boy ...	Songster of Greystanes.	Rosamond ...	Glen Innes Farm..	*
" ...	Wyllieland Bright Lad (imp.)	Wyllieland Gleniffer (7229)	Wyllieland Sangie	H.A. College, Richmond	*
Kerry ...	Rising Sun ...	Bratha's Boy ..	Dawn ..	Bathurst Farm ..	*

*Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed

Department of Agriculture,
Sydney, 2nd April, 1914

BULLS FOR SALE

AT GLEN INNES EXPERIMENT FARM.

AYRSHIRES.—The Poet: calved 17th February, 1912. Sire, Byron; dam, Scotch Heather, by Jamie's Ayr; g d, Leaf Bud, by Prince Emerald (imp.); g g d, Rose Berry, by Mischief Maker of Barcheskie (imp.), 3,892. Price, £10

Byron's Boy: calved 3rd March, 1912. Sire, Byron; dam, Hattie Craig, by Daniel of Auchenbrain (imp.); g d, Juliette, by Mischief Maker of Barcheskie (imp.), 3,892; g g d, Judy IX of Barcheskie (imp.), 11,882, by Traveller of Drumjoan, 1,441. Price, £10.

Bright Boy: calved 8th November, 1912. Sire, Wyllieland Bright Lad (imp.); dam, Moonstone, by Emerald's Mischief; g d, pure Ayrshire Cow, No. 163, Hawkesbury Agricultural College Register. Price, £5 5s.

AT WOLLONGBAR EXPERIMENT FARM

GUERNSEYS.—Bull calf from Sweetheart by Hayes' Fido (imp.); calved 8th March, 1913. Price, £40.

Bull calf from Golden May of the Grone by Hayes' Fido (imp.); calved 4th February, 1913. Price, £30.

Bull calf from Dido by Beaucaire's Baby; calved 27th July, 1913. Price, £30.

GEORGE VALDER, Acting Under Secretary, and
Director of Agriculture.

Plans for Poultry Equipment.

In reply to a correspondent from Curlewis, asking for information on poultry-raising for eggs, Mr. Hadlington advised the continuous house principle, with long, narrow yards. This is really a shed, say, 6 feet 6 inches wide, divided into houses to accommodate the number of birds it is required to be kept in each. Seven inches of perch room for each fowl is a fair estimate, and a house of the width mentioned will take two perches running parallel to each other. A good height for the roof is 6 feet at the front and 5 feet at the back, with length as required.

For breeding pens the yards should be, roughly, 30 feet long by at least 8 feet wide. If the continuous shed is provided it will, of course, require to be subdivided to suit the yards into sections of 8 feet. This, of course, is too much space for a breeding pen of eight to twelve birds, unless half the shed-room can be spared for a scratching shed—that is, 4 feet for roosts and 4 feet for a scratching shed with litter. Or the pens could be made into double-mated ones (sixteen to twenty-four hens with two cocks), which would give good results. A lane at the rear of the building should be provided, so that the eggs can be gathered, and the watering and other attention can be provided without entering the yards.

"The Agricultural Gazette of Canada."

We accord a hearty welcome to this publication, which has just been initiated by the Department of Agriculture of Canada. It will be published monthly in English and in French. Its foreword by the Honorable Martin Burrell, Minister of Agriculture, is as applicable to our own publication as to the one under review.

"To know what others have accomplished; to know their methods of work; to learn the reasons for their successes and failures, is to broaden our own sympathies and to stimulate our own enthusiasm. It is hoped, therefore, that *The Agricultural Gazette* may promote the common good by linking up the efforts of widely scattered students in the same field."

It is somewhat significant that both in the United States, the home of the agricultural bulletin, and in Canada, journals of the *Agricultural Gazette* type, so familiar to Australian readers, have recently been started. In the United States the *Journal of Agricultural Research* is but twelve months old, and is evidently supplying a need that the bulletins failed to do.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1914.

Society.	Secretary.	Date.
Cooma P. and A. Association	C. J. Walmsley	April 1, 2
Coonabarabran P. and A. Association	G. B. McEwen	„ 1, 2
Upper Hunter P. and A. Association, Muswellbrook	R. C. Sawkins	„ 1, 2, 3
Taralga A., P., and H. Association	G. Goodhew	„ 2, 3
Royal Agricultural Society (Sydney)	H. M. Somer	„ 7–15
Adaminaby P. and A. Association	W. Delany	„ 15, 16
Batlow A. Society	C. S. Gregory	„ 21, 22
Kyogle P., A., and H. Society	R. J. Nithery	„ 22, 23
Bathurst A., H., and P. Association	J. Bain	„ 22, 23, 24
Hunter River A. and H. Association (West Maitland)	E. H. Fountain	„ 22, 23, 24, 25
Luddenham A. H. A. Society	F. S. Leggo	„ 28, 29
Tamworth P. and A. Association	J. R. Wood	„ 28, 29
Richmond River A., H., and P. Society (Casino)	D. S. Rayner	„ 29, 30
Warren P. and A. Association	A. C. Tompson	„ 29, 30
Orange A. and P. Association	W. J. I. Nancarrow	„ 29, 30 May 1
Northern Agricultural Association (Singleton)	J. McLachlan	„ 29, 30, May 1

AGRICULTURAL SOCIETIES' SHOWS—*continued.*

1914.

Society.	Secretary.	Date.
Dubbo P., A., and H. Association	F. Weston ...	May 5, 6
Dungog A. and H. Association	C. E. Grant ...	,, 6, 7
Port Macquarie & Hastings Dist. A. and H. Society...	T. Dick ...	,, 6, 7
Clarence P. and A. Society (Grafton)	G. N. Small ...	,, 6, 7, 8
Hawkesbury District A. Association (Windsor) ...	H. S. Johnston ..	,, 7, 8, 9
Lower Clarence A. Society (Maclean)	J. McPherson ...	,, 12, 13
Warialda P. and A. Association	C. J. Devine ...	,, 12, 13, 14
Coonamble P. and A. Association	J. C. Wilson ...	,, 13, 14
Gloucester A., H., and P. Association	G. E. Furness ...	,, 20, 21
Trangie P., A., and H. Association	A. K. Butter ...	,, 20, 21
Walgett P. and A. Association	W. Neal	,, 27, 28
N.S.W. Sheepbreeders' Association (Sydney) .	H. N. Bowden ...	July 1, 2, 3, 4
Deniliquin P. and A. Society	L. Harrison ...	,, 16, 17
Narandera P. and A. Association	W. T. Lynch ...	Aug. 4, 5
Corowa P., A., and H. Society	John D. Fraser ...	,, 18, 19
Murrumbidgee P. and A. Association (Wagga Wagga)	A. F. D. White ...	,, 25, 26, 27
Wellington P., A., and H. Society	A. E. Rotton ...	Sept. 1, 2
Grenfell P., A., and H. Association	G. Cousins ...	,, 1, 2
Gunnedah P., A., and H. Association	M. C. Tweedie ...	,, 1, 2, 3
Manildra P. and A. Association	A. Anderson ...	,, 2
Albury and Border P., A., and H. Society	W. I. Johnson ...	,, 8, 9, 10
Ganmain A. and P. Association	J. F. Ashwood ...	,, 15, 16
Cootamundra A., P., H., and I. Association	T. Williams ...	,, 15, 16
Cowra P., A., and H. Association	E. W. Warren ...	,, 16, 17
Murrumburrah P., A., and I. Association	J. A. Foley ...	,, 22, 23
Temora P., A., H., and I. Association	J. Clark	,, 22, 23, 24
Yass P. and A. Association	W. Thomson ...	,, 30, Oct. 1
Hay P. and A. Association	G. S. Camden ...	Oct. 6, 7
Hillston P. and A. Society	S. J. Gordon ...	,, 7,
Tweed River Agricultural Society	A. E. Budd ...	Nov. 11, 12

1915.

Guyra P., A., and H. Association	P. N. Stevenson ...	Feb. 23, 24, 25
Glen Innes & Central New England P. & A. Assoc'n ..	G. A. Priest ...	Mar. 9, 10, 11
Inverell P. and A. Association	J. McIlveen ..	,, 17, 18, 19
Quirindi P., A., and H. Association	H. H. Rourke ..	,, 23, 24,

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Agricultural Gazette of New South Wales.

The Dipping of Sheep in New South Wales.

H. S. MAJOR, Assistant to the Sheep and Wool Expert.

The Minister for Agriculture has approved of the recommendation that the infestation of sheep with Sheep Louse (*Trichodectes sphaerocephalus*) or Sheep Tick (*Melophagus ovinus*) be declared a disease under Section 3 of the Stock Diseases (Tick) Act of 1901.

When the regulations as framed become law, they will give Stock Inspectors power, on receiving the authority of the Chief Inspector of Stock, to compel owners to dip their infested sheep properly until they become free from these external parasites; and until dipping can be satisfactorily arranged, to take such other measures as temporary quarantine, &c. They also provide for penalties for failure to comply.

The regulations will not make the dipping of all flocks in this State compulsory, and an owner need never dip his sheep so long as he can satisfy the authorities that his sheep are clean.

A similar measure is in force in Victoria, Tasmania, and South Australia.

In England the Sheep-Dipping Act came into operation in 1848. This specially referred to scab. For a long time the Act was of little service, as in many cases Inspectors were not appointed, and the disease went unchecked. Old remedies, such as smearing with mercurial ointment, were resorted to, and many sheep died of blood poisoning. In the early history of sheep in Australia scab was very prevalent, but happily nothing has been heard of it for about forty years. There is no reason why ticks and lice should not be absolutely wiped out if sheep men will help the Government in its action.

At some of the leading sheep shows ticky sheep have been exhibited, much to the disgust of rival exhibitors who have clean sheep in adjacent pens. Under previously existing regulations nobody was empowered to take any action. Such an occurrence in the future would result in at least the isolation of the affected sheep.

The dealer who buys and travels sheep all over the country often makes himself obnoxious to many careful breeders. In the past dirty sheep have been brought into clean country. These are the men whose actions the dipping regulations will greatly check in the near future.

Distribution of Ticks and Lice in New South Wales.

Ticks have been known to infest some of our flocks since the inception of sheep-breeding. Lice, apparently, are a much more recent trouble in this country. Hitherto the pale colour and small size of the sheep louse enabled

it to escape the observation of very many sheep farmers. They will see the sheep biting and rubbing themselves, and only ticks are suspected, when in many cases both classes of vermin are active. Unless a man knew what to look for he would fail to observe the lice against the pink skin and on the yolky wool.

Flocks depastured in the cold, elevated, and generally heavy-timbered (particularly stringybark) districts of New South Wales, seem to be most subject to vermin attack. Such districts are the Upper Murray Valley, and all along the slopes of the Tablelands, extending from the Monaro in the south to New England in the north. Dipping in these parts is carried out by most breeders. Very few vermin are found on sheep out on the western plains, or west of a line drawn across the map through Urana, Dubbo, and Moree. Occasionally vermin are seen in the west, but their appearance is no doubt due to the immigration of infested sheep. The hot and dry conditions are unfavourable to ticks and lice.

Though these vermin do not live long off the sheep, camping grounds, rubbing posts, and bits of wool are sources of fresh infection.

Effect of Vermin on a Sheep and its Wool.

A sheep attacked by such external parasites does not thrive, and will quickly become languid and anæmic. The biting of the ticks and lice causes the animal to rub and bite its wool over the seat of irritation. Its fleece soon presents a dishevelled appearance. The experienced and keen observer will quickly notice the first stages of attack by a little disorder and generally a paleness of the tips of the wool, even though the attack be confined to a few square inches of the skin. A badly infested sheep will quickly fall away in condition, and the weight of fleece will be materially lessened. In addition the delicate fibre exhibits a weak, thin, "hunger-fine" growth. The whole fleece often becomes knotted and slightly felted. There is also considerable discoloration caused by "dead" yolk, which may sometimes result in a light and permanent stain after scouring. There is a peculiar odour associated with "ticky" wool, and in the case of very bad attacks this odour also remains in the wool after scouring. Many of the minute black dung particles of the parasites, together with the pupæ cases, still adhere to the wool to indicate to the ever alert wool-buyer its character, and the wool suffers considerably in value.

The Objects of Dipping.

By dipping is meant the thorough immersion of a sheep in some liquid specific which is strong enough to kill all ticks and lice present; and, owing to the retention of chemical dip elements by the skin, wool, and yolk, to kill any ticks and lice which subsequently may hatch from live pupæ; and also to assist a sheep to resist reinfection from a vermin-infested sheep with which it may come into contact.

Moreover, dipping, if carried out properly, promotes a clean, healthy, active skin, and where such is present a bright, healthy growth of wool is assured. The benefits are very apparent at the shearing ten or eleven months later.

There are many out-back pastoralists who, though they have no ticks, would dip for other beneficial reasons, were it not for the trouble of bringing the flocks to the one centre. The mustering operations on some of these big stations occupy a period of four or five weeks, and the travelling of sheep in this dry country in the heat and dust should always be avoided if possible.

General Construction of Dips in Use.

Briefly, a dip consists of a long, narrow swimming bath about 2 feet wide and 5 feet deep. At the entrance are the forcing pens and race, and at the exit are the draining pens. The differences in the construction of dips chiefly lie in the arrangement of the accessory parts. Various schemes are used to outwit the sheep and bring him to the brink of the bath. Sheep do not "take to water" so readily as other farm stock. The flock will follow a leader to safety or disaster, and this characteristic is often made full use of. The straight walk-in dip is about the simplest. Here the entrance race and bath are in the one line, and sheep enter the water from the ground level. In this case the race should be floored, and occasionally swept, as otherwise the sheep will carry into the bath much dirt from the yards. In the "side-dip" the race is elevated and at the side of the bath. The sheep walk to a dead end, but slip sideways into a basin below. A piece of bagging reaching down to the chute shuts out from the sheep's view the bath below. Many owners prefer a small catching pen built over one end of the bath. Each sheep is caught and carefully pushed down an incline into the dip.

Moving platforms and elevators are on the market, and serve to carry the sheep along and precipitate them into the bath.

Decoy sheep are sometimes held in a pen placed at the end of the race, near the bath. At the dead-end of the "side slip" race this is necessary. Much of the success of drafting or dipping, as regards time, depends on the maintenance of a full race of sheep.

There are a few dips built under cover inside shearing sheds. The sweating pens are utilised as yards and draining pens, and under the battens of the draining portions sheets of corrugated iron carry the drainage back to the bath. A few such dips are in use in the Riverina.

The latest and most unique of dips is the Queensland Shower Bath arrangement. The dip is at present in use on several Queensland stations, and is said to be giving every satisfaction.

Briefly, the arrangement consists of a square pen large enough to hold about 200 sheep, over which is a flat tin roof closely perforated. The liquid is pumped on to the roof, and the sheep below receive a shower bath of about seven minutes' duration, which time is considered sufficient for the

thorough saturation of the sheep. This dip is considered very suitable for large holdings. The construction is very cheap, and the cost of dipping ½d. to ¾d. per sheep. A couple of faults suggest themselves. The shower may not reach and sufficiently saturate the under parts of the sheep. The belly, flanks, &c., afford good shelter to, and are the first parts attacked by, ticks and lice, as these vermin dislike the sun and light. In addition, foreign particles will block the perforations in the roof, and render an occasional sweeping necessary.

All dips should be built near the shearing shed, on high ground, even on an abrupt ridge, so that the liquid can be syphoned out easily. Sometimes the floor of the bath is made to slope gradually, in order to give a fall of a few inches at one end. A plug is fitted, and from it a pipe, about 3 inches in diameter, leads out through the earth to a drain near by. Of course, the natural surroundings will not always permit of this emptying arrangement. A fairly big outlet pipe is necessary, as a lot of sediment collects at the bottom of the bath. Care should be taken to ensure that the drainage does not flood the pasture or water to which sheep have free access.

The bath is usually built of brick and cement, or concrete. In Victoria there are many wooden dip-baths, which have rendered good service for nearly twenty years, and one has been in use on a model property in New England, New South Wales.

Mortised pine boards, about 5 inches x 1¼ inch, are securely nailed to a stout hardwood framework. The life of a wooden dip is considerably prolonged by keeping it filled with water for the greater part of the year when not in use. In fact, this care is essential. The draining pens, particularly in hot districts, should be covered as protection from the sun. The sheep's droppings should not be allowed to reach the bath with the liquid from the draining pens. Two little gulley traps will collect this matter.

Many well-known stud owners in this State dipped their rams and ewes intended for show and sale, long before the dipping of the whole flock became a general practice with them. For the purpose a tank is sunk into the ground, and each sheep carefully held in the bath for the desired time.

On the market there are small baths specially constructed of iron or steel to suit the requirements of the farmer possessing any number up to about 1,500 sheep.

Opinions differ greatly as to the length of swim necessary. Apart from the consistency of the dip mixture, the effectiveness of the operation depends not so much on the distance the sheep have to swim as on the duration of immersion. A long bath is more expensive; it also holds more liquid. For these reasons short swims are given, but the sheep are delayed in the bath by the use of the "crutch."

When to Dip.

A period of one minute is considered necessary for the immersion, and during that time each sheep should, in turn, be ducked under. Sheep should not be dipped until they have sufficient growth of wool to carry some of the dip ingredients, and also to protect the skin.

A Merino can be effectively dipped earlier after shearing than a crossbred, because the wool of the former is fine, dense, and more yolky, in consequence of which the residue of the dip liquid will be held better. For the same reason a hand-shorn sheep can be dipped sooner "off-shears" than a machine-shorn sheep. Crossbreds are more easily managed, and swim better than Merinos.

For convenience, a few of the bigger stations dip straight off-shears; but this practice cannot be recommended. To the man possessing anything up to 10,000 sheep, a second mustering of the flocks shortly after shearing does not involve so much labour and time as in the case of a big pastoralist owning, say, ten times that number. The best authorities assert that Merinos should be dipped from one month to six weeks after shearing, and crossbreds about two months after.

Precautions in Dipping.

The liquid capacity of the bath should be accurately gauged, and after measuring out the proportional amount of powder or concentrated liquid, every care should be taken to mix as prescribed. Very serious losses are the result of careless calculations. For preference use rain water instead of that from creeks and springs, as the latter sometimes carry large quantities of lime or iron, consequently the water will be "hard," and as such will lack the penetrating power of "soft" water. "Hard" water renders the mixing of many dips more difficult, and will sometimes make the wool harsh.

There is a danger of sheep swallowing too much of some dipping preparations, and thus being poisoned.

As sheep are usually dipped about a month after shearing, all cuts by then will have healed. When sheep are dipped directly after shearing there is always a danger of blood poisoning through the broken skin. Deaths are sometimes attributed to this, but we are unable to confirm the reports, as no *post mortem* examinations or laboratory tests have been made. Concerning the danger of dipping sheep suffering from grass-seed perforations of the skin, a practical pastoralist has ventilated his opinion. He states *inter alia* :—

"There would be no danger in running sheep through a good arsenical dip, properly mixed and stirred, if they were suffering from sores caused through grass-seed.

"The arsenical dip acts as an antiseptic; and, though it may make sheep very badly affected with grass-seed somewhat sore, there is practically no danger."

The agitation of the liquid caused by the struggling sheep will send to the surface a frothy scum, which should be skimmed off before renewing operations after meal hours or "smokos." Again, no matter what care is taken, a certain amount of filth from the yards and draining pens finds its way into the bath.

Dust in Wool.

One great point generally overlooked by those who dip is the amount of dust, sand, &c., held in the short wool at the usual dipping time, summer.

Anyone who has had practical experience in wool-scouring, or has even washed little samples of wool, can vouch for the extraordinary amount of dirt which the tips of the wool hold, and which to the layman may appear only as so much discoloration. During the dipping much of this earthy matter is washed out, and mixes with the dip solution. Thus, foreign matter is constantly accumulating, and the strength of the dip is being weakened. The bath should be emptied and thoroughly cleaned when it is apparent that the liquid is heavily laden with filth. Sheep emerging from this admixture carry on their backs much of this harmful matter, which settles on the skin and dries into the wool. This is the cause of "Dip-stained Wool." The tip is not only discoloured, but sometimes the staple is decidedly tender at a point along its length corresponding to the length of wool on the sheep at dipping time. Owing to this fault the wool on hundreds of sheep in the one flock is considerably depreciated in value. A short bath will naturally require a clean-out more often than a long bath.

From the draining pens the sheep should be released into a clean, sheltered paddock. Choose bright, sunny days for the work, and on no account should cold, wet sheep be left in a shed over-night. It costs from ½d. to ¾d. per head to dip sheep, and, when properly carried out, no other operation on the sheep run shows such overwhelming advantages for the outlay.

From a booklet issued by a firm of dip manufacturers the following maxims are extracted as being worthy of the fullest consideration :—

Freedom from vermin depends not only on the dip, but the thoroughness in the use of it.

Driving sheep immediately before or after dipping is mainly the cause of mishaps. Long fleeces increase these risks.

If heavy rain should fall upon newly-dipped sheep before the dip has dried, the dip is apt to be washed out.

Do not overcrowd the draining pens, especially in hot weather.

Sheep would scald if exposed to very hot sun after dipping in pure water only.

As soon as ewes are shorn, parasites will leave them for the more protective covering on their lambs (if unshorn).

Lambs require effective protection like grown sheep.

Don t rush the sheep through. Give the dip time to reach the disease or insects.

An axiom in dipping sheep is that increase of strength can never make amends for insufficient immersion.

External Parasites in Sheep.

MAX HENRY, B.V.Sc., M.R.C.V.S.

In Australia we are fortunate in that we have eradicated the most destructive parasite which affects sheep externally, the mite which causes "Scab," but unfortunately, we have still in this country two parasites which cause a certain amount of preventable loss, and, lest they should eventually cause serious loss, it is desirable that steps should be taken to control them. They can be effectively dealt with on the same principle as Scab, by dipping and, where necessary, quarantining. The two parasites are generally referred

to as "Lice" and "Ticks." The louse which affects sheep is known as *Trichodectes sphaerocephalus*, and is a small six-legged parasite with a blunt head, brownish white in colour, living on the débris and scurf of the skin, and by its presence and biting causes a considerable amount of irritation, leading the infested animal to rub and bite at the wool. In some cases where infestation is serious, the presence of these lice leads to emaciation and general unthriftiness, and the wool is torn and broken to such an extent that the disease may be mistaken for Scab. The so-called Tick is in reality a wingless fly, scientifically known as *Melophagus ovinus*, and is a reddish brown insect about $\frac{1}{6}$ of an inch long, with six legs, drawing its nourishment from the yolk of the wool, débris of the skin, and the blood which it causes to flow by its bites, the itching following which causes a good deal of irritation.

Sheep affected with Lice and Ticks very readily pass on the infestation to clean stock with which they may come in contact, and it is only in this way, or through the infestation of sheep sheds, sheep trucks, and yards, that the disease is spread. Already two Australian States have taken action with a view of controlling and endeavouring to eradicate these pests. In Victoria a compulsory Sheep Dipping Act is in force, and in the Annual Report for 1912 the Chief Inspector of Stock of South Australia says, referring to lice:—

> Last year I estimated the annual loss to the State in wool at close on £10,000, but I now believe this far below the par, as lice have, I regret to say, been discovered by the Inspectors over a much wider area than previously, and many thousands of sheep will only yield poor clips of low value. It is extraordinary that owners should have to be forced into dipping their flocks when it means so much to them financially.

In New South Wales we would not appear to be infested to the same extent, but there is no doubt that the Sheep Louse in particular is spreading, and the ill-effects due to it are being noticed in various parts of the country. It would appear desirable that the matter should be taken in hand now, with a view to preventing it from gaining a serious hold on our flocks.

The dipping of sheep infested with these parasites is best carried out soon after shearing, as the medicament used can then penetrate right through the wool and destroy all the parasites present. Many effective and well-recognised dipping medicaments are on the market, but the most efficacious are the arsenical dips. Some care is required in handling them, as if sheep are put through which have been badly cut about with shears, and while the cuts are not healed, a certain amount of arsenic may be absorbed through the wounds, while, with careless handling, fatalities may occur both amongst sheep and lambs. Dipping should not be carried out in cold, wet weather, as the sheep may suffer from its effects, contract pneumonia, and die, while there is a certain amount of risk in dipping sheep straight from the shears, although in many cases it is done, and no injury found to occur.

The Reaper-Thresher.

J. W. SHAW, Assistant Inspector of Agriculture.

THE Reaper-Thresher, better known perhaps as, and most commonly termed, the "header," is a comparatively new harvesting machine, which prior to the year 1910 was practically unknown in the wheat-growing districts of this State. In that year a number of the machines were distributed throughout the main wheat districts, and although farmers appeared to favour the principle on which the machine worked, the opinion seemed general that many alterations and improvements were necessary. Each year a number of alterations have been made, and the machines appear to be becoming more popular from year to year.

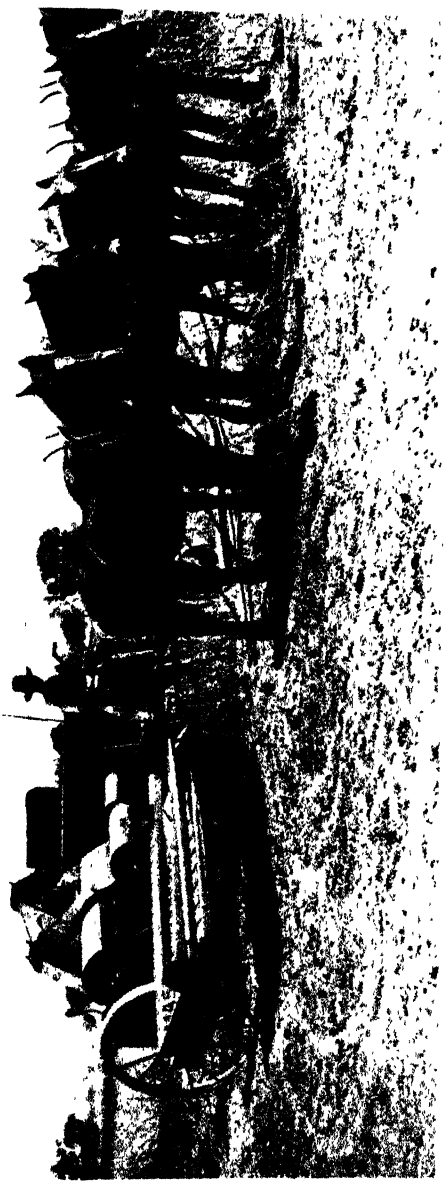
Perhaps the first main difference between these machines and a harvester is that the heads, instead of being stripped or combed off as with a harvester, are cut off by means of a knife, which is worked at the rear of the comb. This knife is worked on a similar principle to the knife on an ordinary reaper and binder. The straw is drawn through the comb until the heads, assisted by the reel (which revolves at about the same speed as the machine moves through the crop), comes in contact with the knife. The fact of the heads being cut off greatly lessens the draught, as the crop cannot pull heavily upon the comb. Should the ground be soft, or the straw at all weak, the wheat is not pulled up by the roots and choked in the comb. When the crop is dirty with thistles or other weeds, there is not the choking in the comb that takes place when the heads are stripped or combed off.

When the heads are cut they are carried by means of the reel on to the conveyors at the rear of the comb. These conveyors are made of canvas, and work in a very similar way to the platform canvas on a binder. This platform is on rollers, and carries the heads along to a feeder, where they are evenly forced into the threshing drum. The drum on the reaper-thresher is very large, and by means of pinions can be altered and made to travel faster or slower to meet varying conditions. A second drum, or really a cavings thresher, is placed at the rear of the machine to rethresh any broken heads which may have escaped the first threshing.

By means of straw walkers the straw is taken from the threshing drum and thrown out at the side of the machine at the rear of the grain wheel. The grain falls on to a graded pan situated beneath the walkers, where it feeds evenly on to the riddles, and is winnowed. The grain is then carried by means of elevators up into the grain box, which has a capacity of five bags.

The machine takes an 8 feet cut, and with two average teams of, say, five horses each, in a fair crop, from 15 to 20 acres may be harvested in a day. There is very little waste of grain as compared with some other harvesters, and the lightness of draught, and its power to deal with a weedy crop, make it a most valuable addition to the wheat-grower's plant.

A number of farmers object to the width of the machine, necessitating wide gateways. By altering the grain wheel the width of the machine may be lessened, but unless this is done it requires a space of not less than 18 feet. This difficulty can be overcome, however, by placing the machine on a kind of sledge, and drawing it through the gate sideways on.



A front view of the Reaper-Thresher.

The Reaper-Thresher in a good crop of Cleveland Wheat.

Wheat Straw Breaking Down through "Contortion" or through the attack of Insects.

G. P. DARNELL-SMITH, B.Sc., F.I.C., F.C.S., Biologist.

SEVERAL cases came under notice during the past season in which wheat straw had buckled or twisted in its growth, as if constricted or hindered in its normal rate of extension. A kink in the straw resulted, and, as it ripened, the wind caused the affected straw to break at the weak point, the result being that the crop sometimes looked as if people had been trampling recklessly through it.

The appearance of the affected straw is shown in the accompanying illustration. Mr. Pridham, Plant Breeder, reported the occurrence of wheat so affected at Nyngan, where field plots of Steinwedel showed many of the straws broken down; at Wagga, where two selected bulk sowings, the one of Rymer, the other of Bobs, were affected; and at Cowra, in the case of two crossbred wheats which appeared to have strong straws. The particular character of the straw seemed to be of little importance, for the wheats at Nyngan and Cowra had strong straw, while those at Wagga were inclined to be weak.

Two explanations have been offered of the cause of this kinking of wheat straw, viz., that it is due to the attack of insects, or that it is due to disproportionate growth in one direction as contrasted with that in another.

Wheat affected similarly to that above described was reported from Carrathool and Deniliquin in 1900 (*Agricultural Gazette*, vol. XI, p. 1169).

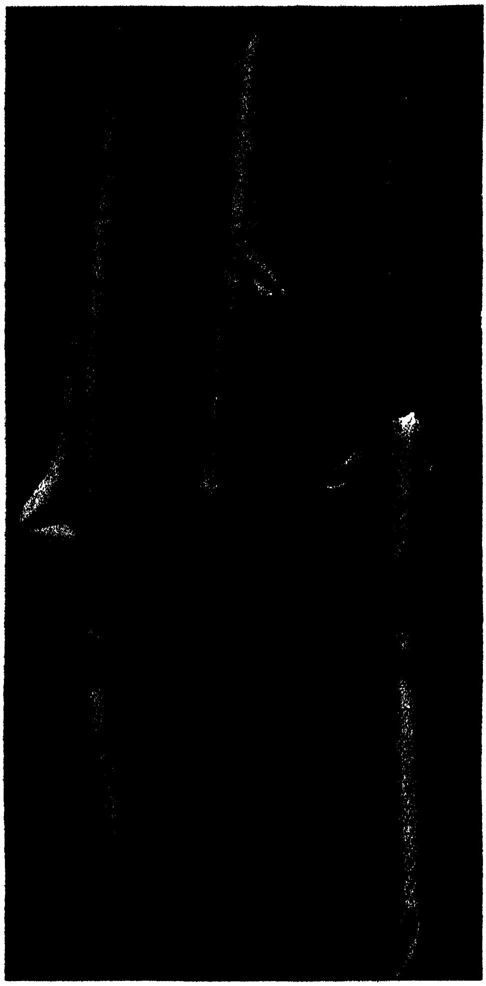
Mr. Froggatt visited the former place, and found that instead of the Hessian fly (as had been suspected), the damage was caused by *Aphidæ*.

These insects attacked the wheat stalk when about 6 inches high, sheltered in the enveloping flag, sucked up the sap on one side, and caused the young wheat stem to bend over or to twist almost into a knot before shooting again.

The aphides were subsequently destroyed by parasites; the wheat then shot up, but when about 4½ feet high, and when the heads were filling, the weight caused many of the stalks that had been attacked by aphides to break off where the stems were twisted.

Specimens of straw affected in the season 1912–13 did not reveal the presence of any aphides or of any fungus disease when examined at the Biological Branch, neither were aphides observed attacking the wheat crops at Nyngan, Wagga, or Cowra during this year.

Mr. Maiden, Government Botanist, who examined some of the affected stems, stated in his report, "It will be noticed that buckling takes place nearer the lower nodes, that is, in the region of the greatest restriction of growth. A phenomenon of this kind is called "contortion" by Masters (Vegetable Teratology, page 316), and is defined as follows:—"An irregular twisting or bending of the stem or branches, the inducing causes being often some restriction to growth in certain directions, or the undue or disproportionate growth in one direction as contrasted with that in another."



Portions of Wheat Straw, showing buckling near the lower nodes.

Unfortunately the kinking of wheat straw, due to the attack of aphides, or due to an abnormal growth contingent on an irregular rainfall, does not admit of the application of remedial measures.

Mr. Pridham has called attention to another abnormal growth, seen in some seasons when late rains come, viz., the formation of additional spikelets in the ear, giving it a crowded appearance. Seeds planted from these ears do not again produce ears with additional spikelets unless identically similar weather conditions occur during growth.

Harvest Reports—Season 1913-14.

GLEN INNES EXPERIMENT FARM.

R. H. GENNYS, Manager.

HARVEST was concluded on the 12th February last. The results are considered very satisfactory, in face of the fact that a hailstorm on 13th December destroyed many bushels of wheat and oats.

Frosts were experienced on several nights both in October and November, and did slight damage to the wheat crops. Haynes' Blue Stem showed distinct signs of cutting, whilst Genoa beside it escaped it altogether.

Cultivation.

The land, where practicable, was worked thus: Ploughed, then cultivated with spring-tooth cultivator, finally sown with disc drill, and where required manure was sown with the seed at from 50 lb. to 75 lb. per acre. The average sowing was 1 bushel of wheat and 1½ bushels of oats per acre for grain, and about ½ a bushel more per acre for hay—if sown very early a little less, and if sown very late a little more.

Lessons of the Season.

Early sowing of most varieties, where practicable, is of great importance, both as regards the quantity and often (on account of the freedom from rust, &c.) the quality of the hay and grain yielded. This year's results of Algerian oats confirms this:—

Early sown	62 bushels per acre.
Midseason	58 „
Late	31 „

These oats were in areas of 30 acres, 9 acres, and 40 acres respectively. As to other conditions, the two first were in about the same quality of land, both being manured with 74 lb. of superphosphate. The lastnamed (40 acres) was considered richer oat land and was not manured. It was evident, however, that the early sowing was mainly responsible for the increased yields. This does not disparage the value of superphosphate, for in the poorer and medium soils we have shown its value on many occasions. To escape the wet season (generally January and February) an early harvest is essential under the conditions prevalent in New England.

The hay crops, which were all sown early, are still in stacks. It is estimated that the oaten hay from the Demonstration Area will average fully 2¼ tons to the acre. The wheaten hay—all Haynes' Blue Stem—was taken from very tall crops and was cut just after the flowering stage. It is estimated to yield on the average 2 tons per acre. The total yield of hay is

calculated to be about 240 tons. Approximately, 1,300 bushels of wheat and 4,250 bushels of oats have been thrashed.

White Tartarian oats for hay or chaff generally grows very well in this district, but the fact that it is smut-liable and less palatable to stock than Algerian makes it less desirable than the latter, which has never been smutty here. Algerian, however, in poor hungry land does not grow very tall, and a taller-growing variety should be substituted.

The wheat in the Demonstration Area yielded, approximately, as follows:—

Florence	30 bushels per acre.	Thew	21 bushels per acre.
Genoa ..	23 „	Haynes' Blue Stem	18 „

Haynes' Blue Stem shelled a good deal more than the others in this group.

In another paddock, about a mile away, $13\frac{1}{2}$ acres of Genoa yielded 26 bushels per acre, though much grain was shelled by hail when ripe. This yield is regarded as very creditable, as the larger portion was sown on heavy black soil.

In a roughly-cleared area (intended for grasses after two years' cropping) the yield of Genoa was considerably lighter, viz., 12 bushels per acre. This area had been ploughed in June and July, then cultivated with a two-way disc and immediately sown. A further cause of this low yield was the fact that the hailstorm mentioned above was much more destructive on this part of the Farm.

Both Genoa and its sister, Florence, promise very well for hay and grain in New England, but the former has had the larger and longer test in the field. This variety, however, should be sown earlier than Florence, as the latter is a very quick maturer, and should not be sown too early. Both these wheats are good smut resisters and grain yielders, but are not very strong flour wheats, though the percentage of their flour is good and its colour is excellent. Thew always finds a ready sale for sowing for green feed in coastal and other districts.

No bunt was present on the Farm this year, but the practice of thoroughly bluestoning all susceptible varieties, such as Thew, is strongly advised.

Rainfall table is appended.

	No. of Wet Days.	Points.	Frosts.
1913.—January ...	10	251	0
February ...	6	62	0
March ...	8	485	1 (27th)
April ...	12	125	1 (27th)
May ...	17	480	12
June ...	15	450	15
July ...	11	127	15
August ...	3	60	22
September ...	9	221	14
October ...	10	366	2
November ...	4	161	1 (13th)
December ...	7	538	0
Total Points... ...		3,326	

Very dry from 2nd November to 10th December.

	No. of Wet Days.	Points.	Frosts.
1914.—January ...	13	426	0
February ...	10	256	0
March (to 26th)	19	679	0
Total Points... ...		1,361	

The average yearly rainfall for the last four years was 3,138 points.

BATHURST EXPERIMENT FARM.

R. W. PEACOCK, Manager.

GENERALLY speaking each season brings its problems, and the one under review was not an exception in this respect. Owing to the many factors not under control, and which are so variable, rarely does one season prove the counterpart of any of its predecessors. Farm practice is based upon a general knowledge of the conditions, and the doing of things to give maximum returns and a minimum of disappointments.

During the season the returns must be considered good under the conditions, yet the returns, as judged by pre-harvest appearances, were disappointing. Such was not confined to this Farm or district, but was the prevalent note throughout practically the whole of the wheat belt.

The crops dealt with are those of the Demonstration Area (which is separate from the Experiment Areas), and were in the main grown upon commercial lines; as such they are of special interest to the farmer. The returns were highly profitable. A few varieties were added, of which pure seed was required, which otherwise would not have appeared if worked solely upon commercial lines.

The system of farming followed upon this area is a mixed one, sheep being grazed in conjunction with the growth of main winter cereals.

Rotation.

The combination referred to allows of a profitable crop rotation, in this instance a two-course one. The area is practically divided into two portions, one being under main cereal crops and the other under fodder crops for the sheep the same year. The portion under main cereal crops in one year is brought under fodder crops the next.

Short Fallow.

This system allows of a short fallow of approximately five months preceding the main cereal crops. This short fallow conserves moisture, and allows of considerable quantities being carried over to augment the rainfall

throughout the crops' growing season. Generally speaking, such is necessary to obtain maximum yields. During the fallow period, owing in some measure to the moisture conserved and to the killing of weeds, plant-food material is rendered available, which materially assists the early growth of the crops which follow.

Alternating Fodder Crop.

The fodder crop is sown from the middle of February to early March, and consists of rape and Cape barley, or rape and Algerian oats in alternate drills. These mixtures have proved excellent in the past, and are fed-off for about five months, approximately from the middle of May to the middle of October. The stock are then removed, and before the barley, rape, &c., can produce seeds, the land is ploughed and left fallow until the following March or April, when the main crops are sown. Throughout the fallow period, if rain induces weeds they are destroyed by skim ploughing, as it is imperative that all weeds should be destroyed; otherwise fallowing is in no small measure a farce. The weeds pump out moisture and lock up plant-food material, the opposite of which should be aimed at.

The whole of the area placed under main cereal crops for 1913 was treated as above, and the conserved moisture unquestionably materially increased the yields, and assisted the rainfall throughout the crops' growing period.

Plant Diseases.

The conditions appeared to favour the disease "Take-all," which seriously reduced the yield in paddocks Nos. 6 and 11. Algerian oats are being grown more extensively in the rotations for both grain and hay to keep this in check. It is important to note that the disease was found during the year to attack the oats, but not to the extent to which wheats are affected.

Rainfall.

The rainfall for the year was 19·79 inches, and this, when taken with the low rainfall of 1912, viz., 17 inches, proved inadequate. The distribution was faulty. Good rains fell during the autumn, and ensured a good vigorous start, and further good falls occurred in October, which were decidedly beneficial. The very dry November and December, together with the high temperatures, reduced the yields considerably, practically all the crops yielding below expectations.

The monthly falls were as follow:—

January ...	161 points.	July... ...	74 points.
February ...	80 „	August ...	75 „
March... ...	299 „	September ...	159 „
April	241 „	October ...	313 „
May	278 „	November ...	42 „
June	182 „	December ...	75 „

Manuring.

The practice followed is to manure the fodder crops with 56 lb. of superphosphate per acre, and to give a further dressing of 30 lb. per acre to the main cereal crop at seeding.

Check strips were left to ascertain the effect of the dressing at seeding time.

In the case of the oat crop, 56 lb. of superphosphate was added when sowing.

A table showing the comparative results of the manured and unmanured portions is appended.

TABLE showing beneficial results of manuring with Superphosphate.

Paddock.	Crop.	Manured.		Unmanured.		Difference due to Superphosphate.	
		bus	lb.	bus.	lb.	bus.	lb.
6	Cleveland Wheat	30	40	23	20	7	20
11	Federation ,, ...	21	0	19	0	2	0
12	Algerian Oats	56	0	47	0	9	0

General Results.

The highest yield was given by Marshall's No. 3, viz., 30 bushels. Unfortunately our standard, Cleveland, was not grown in the same paddock to compare with it. Algerian oats averaged 45 bushels per acre, and the Algerian oaten hay yielded up to 3 tons per acre. The average yield of wheat was 21½ bushels, and of oats 45 bushels.

Varieties.

The three main varieties recommended for the district are—Cleveland for early sowing, Federation for mid-season, and Bobs for late sowing.

Cleveland proved the best of the three mentioned. Marshall's No. 3 and Rymer gave excellent returns in paddock No. 11, but unfortunately no Cleveland was sown in the paddock to allow of comparison. They also were not strictly comparable with either Federation or Bobs.

Features of the Season.

The outstanding features of the season were the favourable seeding period and satisfactory early development due to a favourable winter period much milder than during normal seasons, the excellent promise of the crops, which was not realised owing to the dry and hot weather experienced during the early summer, and the prevalence of "Take-all," which materially reduced the wheat yields, the seasonal conditions appearing to favour the disease.

On the following page will be found a tabulated statement of the treatment, yields, &c.

Demonstration Area, Bathurst Experiment Farm, 1913.

STATEMENT of Treatment, Yield, &c., of Crops.

Paddock No.	Area.	Variety.	Previous Crop.	Treatment.	Seed per Acre.	Super-phosphate per acre.	Date Sown.	Date Harvested.	Yield per Acre.	Remarks
	acres.				lb.	lb.	1913.	1913.		
5	10·4	Algerian oats for hay.	Cape barley and Algerian oats.	Ploughed 4 in. deep, 15/10/12, ploughed 5 in. deep, 28/3/13.	41	59	29 Mar. ..	11 Nov.	3 tons.	Fodder crop, 1912, practically a failure.
									bus. lb.	
6	22·78	Cleveland wheat.	Cape barley and rape.	Ploughed 4 in. deep, 29/10/12; ploughed 5 in. deep, 5/4/13.	30	31·5	9 April ..	6 Dec.	25 48	A large number of "Take-all" patches was a factor in reducing yield.
11	16·3	Federation ..	,, ..	Ploughed 4 in. deep, 6/12/12; ploughed 5 in. deep, 22/4/13.	31½	31·6	1 May	9 ,,	17 0	
	4·5	Bobs ..	,,	,, ,, .	30	31·6	1 ,, .	2 ,,	12 35	
	2·0	Rymer ..	,, .	,, ,, ..	31	33	25 April ..	2 ,, .	29 43	
	2·0	Huguenot ..	,,	,, ,, ..	31	33	25 ,, ..	8 ,,	15 21	
	1·3	Marshall's No. 3	,,	,, ,, ..	31	33	25 ,,	8 ,, .	30 9	
	2·0	Yandilla King..	,, .	,, ,,	31	33	25 ,, .	8 ,, .	24 23	
	0·75	Steinwedel ..	,, .	,, ,, .	31	33	25 ,, ..	2 ,,	25 48	
12	26·2	Algerian oats..	Algerian oats and rape.	Ploughed 4 in. deep, 6/11/12; ploughed 5 in. deep, 25/3/13.	53	57	18 Mar. .	21 Nov. .	45 30	

Drought-resistant Grasses and Fodder Plants.

E. BREAKWELL, B.A., B.Sc., Agrostologist.

THE exceptionally dry summer through which the interior of New South Wales has just passed provided a good opportunity of investigating those plants which best endured the dry conditions.

It was noticed that of the grasses and other fodder plants growing at the Experiment Farms the following, tabulated in order of drought-resistance, were the most prominent :—

GRASSES—

Panicum bulbosum (Wagga, Bathurst, and Cowra).
Panicum prolutum—Coolah grass (Wagga, Bathurst, and Nyngan).
Andropogon bombycinus—Silky heads (Wagga).
Andropogon intermedius—Rare Blue grass (Cowra and Nyngan).
Andropogon erianthoides—Satin top grass (Cowra).
Panicum flavidum—(Cowra, Bathurst and Wagga).
Chloris gayana—Rhodes grass (Wagga, Nyngan and Cowra).
Poa arachnifera—Texas Blue grass (Cowra and Bathurst).

FODDER PLANTS—

Medicago media—Sand Lucerne (Wagga and Nyngan).
Poterium sanguisorba—Sheep's Burnet (Wagga).
Vicia dasycarpa—(Bathurst).

Grasses.

Panicum bulbosum.—This is a grass introduced from America, and showing out favourably at the Farms mentioned above. It is a very succulent grass, a heavy seeder, and establishes itself readily by root planting.

Panicum prolutum is a native grass, of good succulent growth, and a heavy seeder. It germinates readily from seed at Nyngan Experiment Farm, but root planting had to be resorted to at Wagga and Bathurst.

Andropogon bombycinus (Silky heads).—This is one of the finest of the Blue grasses. It makes much more growth than *Andropogon sericeus* (Queensland Blue grass), and, as already stated, is eminently suitable for dry country.

Andropogon intermedius.—A fine plot of this grass may be seen at Hawkesbury Agricultural College, and appears as well adapted to the conditions existing there as to those of the interior. The grass is characterised by the big clumps it produces, and by its fine broad leaf. Unfortunately, seed planting has so far been rather unsuccessful, but the grass is readily propagated by root planting.

Andropogon erianthoides (Satin Top grass).—This is somewhat similar to *Andropogon bombycinus* in appearance and habit, and, like the latter, is particularly adapted to dry weather conditions.

Panicum flavidum.—This grass and *Panicum prolutum* are, so far, the two most favourable native Panic grasses experimented with. The former has a fine succulent growth, a broad leaf, and is very palatable. It is a heavy seeder, but little data are available as to its success from the sowing of seed. It propagates itself readily by root planting.

Rhodes grass, although remaining practically dormant during excessively dry conditions, will retain its verdure remarkably well, and will very quickly respond to rain. It can be recommended for most of the light soils of the interior.

Texas Blue grass, for an introduced grass, stands dry weather conditions very well at the Farms mentioned. It has a great reputation in America. Unfortunately, it is a shy seeder, and is generally propagated by root planting. The roots have a creeping habit, and the plants, under suitable conditions, quickly cover a large area of land.

Fodder Plants.

Sand Lucerne, during last summer, proved to be more drought-resistant than Tamworth lucerne at Wagga and Nyngan. This lucerne originated as a cross between the yellow-flowered lucerne (*Medicago falcata*) and the common lucerne (*Medicago sativa*), and in power of drought-resistance exhibits the characteristics of the former. It also differs from the ordinary lucerne in having a procumbent growth, thus being adapted more for pasture than for hay. Its procumbent habit renders it a poorer seeder than Tamworth lucerne.

Sheep's Burnet has proved to be an extremely drought-resistant plant at Wagga Experiment Farm. It makes growth right throughout the year.

Vicia dasycarpa.—This is a vetch lately introduced and showing good promise at Hawkesbury Agricultural College and the Yanco and Bathurst Experiment Farms. It proved to be remarkably drought-resistant at Bathurst Experiment Farm during the recent summer.

Ostrich Farming.

A correspondent who had perused Mr. J. E. Cairnes' article on Ostrich Farming, asked what districts would be suitable for the industry.

In reply, Mr. T. J. Herbert, Advisory Expert in Ostrich Farming, stated that he considered that the western, north-western, and Riverina districts are most suitable. The artesian belt is strongly recommended, as the land is cheap, and fodder can be grown by irrigation for young birds during drought time. For a man with limited capital, the Yanco Irrigation Area is well adapted for ostrich farming.

Insectivorous Birds of New South Wales.

[Continued from page 292.]

WALTER W. FROGGATT, F.L.S., Government Entomologist.

39. The Pheasant Coucal or Scrub Pheasant
(*Centropus phasianus*).

THE popular name of scrub pheasant is a very unfortunate one for this curious bird, which has nothing in common with the true pheasant, except some likeness in coloration of its plumage.

By classification and structure it is a cuckoo, but in its habits it differs from its nearest relations, for instead of the hen laying her eggs in the nests of other birds she constructs a large dome-shaped nest of her own, with an opening on either side, so that her head sticks out of the front door, and her long tail stands out through the back entrance. The nest is usually placed in a tuft of long grass carefully concealed from view, and contains from three to five eggs, very round, dull white, and, as Gould says, "somewhat like those of a cormorant."

Though the Pheasant Coucal ranges as far south as our Illawarra scrubs, it is a rare bird until one gets much further north, and most of the writer's experiences with it have been in the North Queensland brushes and the coastal districts of north-west Australia. Its natural home is in marshy or swampy land where there is plenty of cover, but it also frequents the banks of creeks and rivers. Usually found upon the ground, when one is travelling through the bush, they fly up into the nearest tree with a frightened squeak, and with a series of flying jumps get up to the topmost branches.

Their powerful feet are admirably adapted for the life they lead upon the ground scratching over the rubbish. They are omnivorous in their diet, and though chiefly insectivorous nothing comes amiss to them.

The members of the genus *Centropus* (which is a compound Greek word meaning "spine foot," in allusion to the large claw on the hind toe) are a curious group of birds distributed over the greater part of Africa, India, China, and Malaysia to Australia. The typical Indian species is a large bird over 2 feet in length to the tip of its tail. When describing our species Stephens called it *Cuculus phasianus*, but Illiger created the present genus for an African species, so our bird came under the same heading.

The plate reproduced is copied from Gould, and there is no need with it to give a description of the bird, but it might be remarked that the males are usually smaller than the females, and much darker in their plumage. The inner one in the plate reproduced is the male.

40. The Bronze Cuckoo (*Chalcococcyx* (*Lamprococcyx*) *plagosus*).

Australia is rich in the number of species of cuckoos in her bird fauna, but most of them are shy, retiring birds that are seldom noticed by the casual observer.

This pretty little cuckoo is one of the best known of the family from its habit of coming into our gardens and orchards looking for insects. It is a great favourite with the vine-growers, because it is one of the very few birds that will eat the vine-moth caterpillar (*Agarista glycine*), which often does so much damage to the foliage and young grapes in the early part of the season.

It is not uncommon about the suburban gardens near Sydney, but is a quiet, shy bird, flitting about among the vines and trees hunting for insects, seldom when feeding giving its gentle whistle-like call note. Wheelwright, author of the "Bush Wanderings of a Naturalist," published in 1861, gives many notes on the birds in Victoria, and says: "The bronze cuckoos were very common in the honeysuckle scrub; they have a very loud cry for their size, resembling that of the English wryneck." The female has the true cuckoo instinct of finding a foster-mother for her offspring, and, laying aside all motherly feelings, hunts round until she finds the nest of either the little "blue wren" or the "silver-eye," in which she places her olive-green eggs, and flies away with no family cares to worry her.

Like many of the other cuckoos, however, she has a large list of other small birds that she favours with her eggs. Campbell says, "She usually chooses the covered-in nests of the *Acanthizae* (Tits) tribe, but other species of builders of dome-shaped or secluded nests are chosen," and he gives a list of twenty-seven small birds, of various families, in the nests of which this cuckoo's eggs have been recorded.

In this bird the scientific, as well as the popular, name is well chosen, as the generic name is composed of two Greek words (*Lampro coccyx*), the first meaning shining and the second a cuckoo; it has, however, been recently placed in the allied genus *Chalcococcyx*, but is better known under the old name.

In the bronze cuckoo we have a very friendly and useful bird in our gardens and orchards, but its value is discounted to a great extent from the fact that it is a parasite in the nests of so many other useful little birds, the baby cuckoo generally living at the expense of its foster brothers and sisters.

INSECTIVOROUS BIRDS OF NEW SOUTH WALES.

"THE PHEASANT COUCAL."

Centropus phasianus.

Dark form, male; lighter-coloured, female.

INSECTIVOROUS BIRDS OF NEW SOUTH WALES.

"THE BRONZE CUCKOO."

Chalcococcyx (Lamprococcyx) plagosus

Young, male and female

Field Experiments with Wheat.

WAGGA EXPERIMENT FARM, 1913.

H. BARTLETT, Experimentalist.

The Season.

(THE Experiments Supervision Committee, under whose control these experiments are being conducted, wish to draw the attention of farmers to the fact that final conclusions cannot yet be drawn from these trials, as they have only been conducted for a few years. Later, when results for, say, five years are available, a summary will be prepared, as sufficient evidence should then be available to enable conclusions to be formed. Meanwhile it is felt that the public are entitled to know the results obtained each year.)

The season of 1913 cannot be classed as ideal. It was certainly favourable for the crops sown during April; but the later the crops were sown the more disappointing the yield became. Although the fallows were well worked, the subsoil contained but little moisture, as rain did not fall in abundance during the summer months.

The soil was in ideal condition for sowing, light surface showers supplying the necessary moisture for germination. Similar showers continued to fall till September, when the crops looked particularly promising; but with the advent of dry conditions the later sown crops made but little headway, while the early sown ones, with their greater root system, managed to keep growing.

Hot, drying winds during October were the cause of parts of heads of the late sown crops being burnt. In many cases more than half the spikelets were destroyed.

The above conditions are absolutely the reverse of 1912, and show how the results may vary according to the season. A summary from four years' experiments has been prepared, which may be of help in arriving at conclusions; although the greater the number of years in which the experiments are conducted, the more reliable the information will become.

Distribution of Rain during 1913.

TOTAL RAINFALL FOR YEAR 1913 = 16·36 INCHES.

		Points.			Points.
January	3rd	38	March	6th	39
,,	12th	10	,,	7th	62
,,	15th	22	,,	10th	170
,,	17th	2	,,	11th	15
,,	29th	5	,,	13th	37
			,,	15th	17
	Total	77	,,	26th	47
February	6th	22		Total	387
,,	15th	91			
,,	16th	33			
,,	17th	3	April	7th	7
	Total	149		Total	7

Distribution of Rain during 1913—*continued.*

		Points.
May	2nd	59
,,	3rd	13
,,	6th	34
,,	8th	4
,,	14th	26
,,	19th	4
,,	30th	106
,,	31st	4
	Total	250
June	2nd	4
,,	18th	6
,,	24th	46
,,	25th	4
,,	26th	59
,,	30th	3
		122
July	18th	29
,,	28th	30
,,	29th	11
	Total	70
August	1st	15
,,	3rd	37
,,	9th	12
,,	16th	13
,,	21st	22
	Total	99

		Points.
September	5th	49
,,	6th	8
,,	11th	8
,,	13th	28
,,	14th	8
,,	17th	13
,,	19th	21
,,	20th	13
,,	24th	13
	Total	161
October	15th	47
,,	16th	12
,,	25th	40
,,	27th	47
,,	29th	34
,,	31st	15
		195
November	13th	24
,,	25th	24
	Total	48
December	24th	44
,,	25th	7
,,	31st	20
	Total	71

Previous Crops.

The paddock used for experiments during 1913 was No. 1. In 1910 portion of this paddock was sown with wheat experiments, the remaining portion being under a crop of rape. In 1911 the whole of the paddock was cropped with Skinless barley, and was then fallowed during 1912.

Preparation of Ground.

The land was ploughed with mould-board ploughs during the last week in June, 1912, and harrowed immediately after. The one-way disc cultivator and harrows were used on the fallows during October, February, and April, the depth of cultivation being approximately 3 inches, and all the working of the land was across the direction of the plots. In this paddock Experiments I to VI were sown.

The Method of Comparison—Percentage Yields.

In accordance with the practice adopted in connection with these experiments, the results of each plot are not compared with one another, but with an assumed natural yield of that plot based upon the yields of the two adjacent check plots, and proportionate to the distance from them. This will account for the apparent anomaly, in some cases, where a lower yield than its neighbour on the list carries a higher percentage.

The variations in the yields of the check plots are obviously due to differences of soil, and other unpreventable causes.

EXPERIMENT No. 1.—VARIETY TRIAL.

Object:—To determine the most suitable varieties of wheat for hay and grain in this district.

The experiment is divided into the following sections:—

(a) Early planting—fed off.
(b) „ „ —not fed off.
(c) Mid-season planting.
(d) Late planting.

Sections (a) and (b) were sown 8th April, 1913.
„ (c) was sown 21st May, 1913.
„ (d) „ 1st July, „

Treatment of Seed.

Just previous to sowing, the seed was immersed in a 1 in 480 solution of formalin for five minutes.

Rate of Seeoing.

Throughout the four sections of the experiment the seed was sown at the approximate rate of 35 lb. per acre.

Manuring.

All the plots received an application of 56 lb. of Shirley's superphosphate per acre.

Results.

The Early planting was the favoured section during 1913, the yields generally being exceptionally high. Even the mid-season varieties, which should give the best results when sown a month later, eclipsed the yields of the other sections, the only exceptions being the very early varieties, such as Firbank, Bunyip, and Florence, of which, although making splendid growth, the grain yield was practically nil, and the hay was of very poor quality owing to the severe damage occasioned by frost.

This result confirms the Departmental advice that in no case should early varieties be sown during April.

Section (a), Early planting, Fed-off, was fenced and fed-off with sheep during the first week in June. The feeding was very even over the whole of the block, except where Comeback and Warren were growing, the sheep showing a preference for all other varieties. Immediately the sheep were removed the block was harrowed.

Hay Results.

The varieties, arranged in order of merit as regards hay yields, are as follow:—

	Early Planting. (Fed-off.)		Early Planting. (Not Fed-off.)		Mid-season Planting.		Late Planting.	
1.	Zealand ...	(100)	Zealand ...	(100)	Firbank .	(112)	Marshall's No. 3	(106)
2.	Marshall's No. 3	(89)	Federation ...	(90)	Bobs	(103)	Firbank ...	(104)
3.	Rymer	(83)	Firbank ...	(90)	Zealand	(100)	Bomen	(102)
4.	Bayah	(81)	Bobs	(88)	Florence ...	(99)	Zealand ...	(100)
5.	Yandilla King ...	(79)	Rymer	(86)	Bayah	(96)	Yandilla King...	(100)
6.	Federation ...	(75)	Bomen	(85)	Marshall's No. 3	(92)	Rymer	(98)
7.	Bomen	(72)	Marshall's No. 3	(83)	Bomen	(91)	Bobs	(98)
8.	Bobs	(71)	Warren	(81)	Bunyip	(91)	Warren... ...	(96)
9.	Firbank... ...	(69)	Bayah	(80)	Rymer	(90)	Comeback ...	(95)
10.	Warren... ...	(69)	Yandilla King...	(79)	Yandilla King ..	(89)	Bayah	(94)
11.	Comeback ...	(59)	Comeback ...	(74)	Comeback ...	(88)	Bunyip	(91)
12.	Florence ...	(50)	Florence ...	(63)	Federation ...	(86)	Florence ...	(90)
13.	Bunyip	(40)	Bunyip	(52)	Warren ...	(76)	Federation	(52)

The figures in parentheses indicate the percentage values of the different varieties, Zealand in each case being the check plot, and taken as 100.

As an indication of the yields obtained in the four sections, the average yields of the check plot, Zealand, in each section are appended:—

	t.	cwt.	qr.	lb.
Early Planting (Fed-off)	3	10	1	12
Early Planting (Not fed-off)	3	15	3	4
Mid-season Planting	2	2	0	16
Late Planting	1	7	3	1

Grain Results.

The varieties, arranged in order of merit as regards grain yields, are as follow:—

	Early Planting. (Fed-off.)	Early Planting. (Not Fed-off.)	Mid-season.	Late Planting.
1.	Federation ... (186)	Yandilla King... (173)	Yandilla King .. (145)	Marshall's No. 3 (145)
2.	Yandilla King (177)	Marshall's No. 3 (169)	Marshall's No. 3 (145)	Yandilla King (141)
3.	Marshall's No. 3 (169)	Federation ... (147)	Federation .. (143)	Firbank .. (121)
4.	Rymer ... ... (166)	Rymer ... ... (136)	Rymer ... ... (124)	Comeback ... (119)
5.	Bobs ... ... (145)	Bomen ... .. (131)	Bayah ... .. (121)	Rymer ... ... (116)
6.	Bomen ... ... (137)	Bayah ... .. (131)	Comeback ... (117)	Bunyip ... ... (112)
7.	Bayah ... ... (125)	Bobs ... ... (118)	Bomen ... ... (112)	Bobs ... ... (110)
8.	Zealand (19·4 bus.)(100)	Zealand(23·3 bus.)(100)	Warren... . (107)	Bomen ... ... (104)
9.	Warren ... .. (91)	Warren .. ... (84)	Bunyip ... ... (106)	Warren ... (102)
10.	Firbank... .. (86)	Comeback ... (59)	Florence ... (105)	Zealand (12·5 bus.) } equal (100)
11.	Florence ... (77)	Firbank .. (37)	Bobs .. ... (102)	Bayah }
12.	Comeback ... (75)	Bunyip ... .. —	Firbank ... (102)	Florence .. (82)
13.	Bunyip ... ... (23)	Florence ... —	Zealand(17·1 bus.)(100)	Federation ... (79)

TABLE I.—Showing Summary of Four Years' Results in Experiment No. 1—Variety Trial.

Hay.

Variety.		Early Planting. (Not Fed-off.) Average Yield per acre.	Per-centage.	Mid-season. Average Yield per acre.	Per-centage.	Late Planting. Average Yield per acre.	Per-centage.
		t. c. q. lb.		t. c. q. lb.		t. c. q. lb.	
1. Zealand	check	2 16 0 20	100	2 9 0 20	100	1 15 1 3	100
2. Firbank		2 10 2 4	86·0	2 1 1 5	86·0	1 11 3 25	91·4
3. Bunyip		1 7 2 7	44·8	1 9 0 25	61·3	1 7 1 18	73·9
4. Zealand	check	3 5 0 20	100	2 10 2 24	100	1 15 2 22	100
5. Florence		1 19 2 1	65·2	1 17 0 21	77·3	1 10 1 7	82·3
6. Bobs		2 12 2 4	83·2	1 17 3 14	80·2	1 13 1 21	99·4
7. Zealand	check	3 4 1 10	100	2 5 3 2	100	1 14 1 14	100
8. Federation		2 13 0 16	90·3	2 0 3 10	87·9	1 6 1 20	75·8
9. Bayah		2 7 0 24	78·8	2 3 3 20	92·4	1 7 1 14	77·8
10. Zealand	check	3 1 2 20	100	2 9 0 14	100	1 14 0 4	100
11. Warren		2 7 1 23	77·0	1 17 3 16	76·3	1 7 1 19	79·5
12. Comeback		2 8 2 9	78·0	1 19 0 6	79·3	1 5 0 9	75·7
13. Zealand	check	3 5 1 9	100	2 10 1 17	100	1 13 1 24	100
14. Bomen		....	......	....	......	....	......
15. Yandilla King		2 6 0 16	76·4	2 2 0 7	90·1	1 10 2 19	91·0
16. Zealand	check	2 18 2 23	100	2 11 0 6	100	1 17 0 0	100
17. Rymer		2 9 3 0	81·6	2 1 3 15	83·9	1 12 0 7	92·5
18. Marshall's No. 3		2 12 1 0	81·6	2 1 0 5	83·9	1 10 0 24	88·6
19. Zealand	check	3 5 1 21	100	2 9 1 3	100	1 12 2 20	100

NOTE.—The early section shows the results of three years only.
The Early Planting (Fed-off) section was conducted for the first time during 1913.
Bomen was cut for hay for the first time during 1913.

TABLE II.—Showing Summary of Four Years' Results—Variety Trial.

Grain.

Variety.		Early Planting. (Not Fed-off.)		Mid-season.		Late Planting.	
		Average Yield per acre.	Per-centage.	Average Yield per acre.	Per-centage.	Average Yield per acre.	Per-centage.
		bus.		bus.		bus.	
1. Zealand ...	*check*	19·1	100	22·5	100	18·6	100
2. Firbank ...		11·7	60·8	20·5	91·4	17·7	94·5
3. Bunyip ...		5·9	30·2	21·3	95·7	18·1	94·5
4. Zealand ...	*check*	21·3	100	22·4	100	18·9	100
5. Florence ...		8·7	43·6	22·0	100·8	20·1	110·2
6. Bobs ...		22·3	104·1	18·5	87·5	19·6	107·3
7. Zealand ...	*check*	21·4	100	20·4	100	19·0	100
8. Federation ...		30·0	138·5	25·9	125·8	18·5	97·3
9. Bayah ...		25·6	116·4	23·6	111·7	17·5	97·5
10. Zealand ...	*check*	22·1	100	21·8	100	17·3	100
11. Warren ...		19·2	88 2	21·4	99·0	16·6	95·2
12. Comeback ...		15·0	70·3	21·9	101·4	16·0	91·5
13. Zealand ...	*check*	21·1	100	21·6	100	18·1	100
14. Bomen ...		27·5	129·9	22·7	109·2	22·1	109·0
15. Yandilla King ...		26·2	124·6	24·3	121·0	19·9	113·2
16. Zealand ...	*check*	20·7	100	22·0	100	19·2	100
17. Rymer ...		24·4	119·1	24·5	117·1	20·7	110·5
18. Marshall's No. 3 ...		24·3	119·2	24·1	111·9	20·6	106·1
19. Zealand ...	*check*	19·7	100	20·8	100	18·7	100

NOTES.—Bomen has only had two years' trial.
Yandilla King has only had three years' trial.
The Early section shows the results of three years only.

EXPERIMENT No. II.—THICK AND THIN SEEDING TRIALS.

Object:—To determine the most suitable amount of seed to sow per acre, with a good stooling variety and a bad stooling variety, when sown early, mid-season, and late.

The varieties chosen for this experiment were:—

Bunyip, early variety and poor stooler.
Zealand, late variety and good stooler.

The amounts of seed sown were as follow:—

For thin sowing, 30 lb. per acre.
For medium sowing, 45 lb. per acre.
For thick sowing, 60 lb. per acre.

The sowing season was divided as follows:—

Early sowing, 8th April, 1913.
Mid-season sowing, 21st May, 1913.
Late sowing, 1st July, 1913.

Table III.—Showing Results in Experiment II.

Hay.

(Area of plots, $\frac{1}{20}$th acre.)

Variety.	Seed, per acre.	Early Planting. Plot	Early Planting. Acre.	Mid-season. Plot	Mid-season. Acre.	Late Planting. Plot.	Late Planting. Acre.
	lb.	lb.	t. c. qr. lb.	lb.	t c. qr. lb.	lb.	t. c. qr. lb.
1. Bunyip	30	217	1 18 3 0	188	1 13 2 8	144	1 5 2 24
2. ,, ...	45	191	1 14 0 12	200	1 15 2 24	151	1 6 3 24
3. ,, ...	60	215	1 18 1 16	208	1 17 0 16	153	1 7 1 8
4. Zealand	30	368	3 5 2 24	243	2 3 1 16	156	1 7 3 12
5. ,, ...	45	375	3 6 3 24	260	2 6 1 20	155	1 7 2 20
6. ,, . ..	60	389	3 9 1 24	265	2 7 1 8	175	1 11 1 0

Grain

Variety.	Seed, per acre.	Early Planting Yield Plot.	Early Planting Yield Acre.	Mid-season. Yield Plot	Mid-season. Yield Acre.	Late Planting. Yield. Plot.	Late Planting. Yield. Acre.
	lb.	lb.	bus.	lb.	bus.	lb.	bus.
1. Bunyip	30	...	.....	58	19·3	46	15·3
2. ,, ...	45	..	... ..	65	21·7	46·5	15·5
3. ,, ...	60	...	......	56·5	18·8	47	15·7
4. Zealand	30	75·5	25·2	43	14·3	34·5	11·5
5. ,, . ..	45	65	21·7	42	14	37·5	12·5
6. ,, ...	60	60·5	20·2	51	17	39·5	13·2

Table IV.—Showing Summary of Results in Experiment II—Thick and Thin Seeding.

Hay.

Variety.	Time of Planting.	No. of Years	Rate of Seeding per acre. 30 lb.	Rate of Seeding per acre. 45 lb.	Rate of Seeding per acre. 60 lb.
			t. c. q. lb	t. c. q. lb.	t. c. q. lb.
Bunyip	Early	2	1 8 3 10	1 7 1 18	1 8 1 6
,, ...	Mid-season	4	1 8 1 25	1 12 3 9	1 10 3 16
,, ...	Late	4	1 7 1 1	1 7 3 15	1 9 1 21
Zealand . ..	Early...	2	2 9 0 12	2 12 0 26	2 16 3 14
,, ...	Mid-season	4	2 9 1 9	2 9 0 23	2 11 0 15
,, ...	Late	4	1 15 2 0	1 16 0 14	1 17 0 21

Grain.

Variety.	Time of Planting.	No. of Years.	Rate of Seeding per acre. 30 lb.	45 lb.	60 lb.
			bus.	bus.	bus.
Bunyip ...	Early...	2	5·7	5·8	6·5
,, ...	Mid-season ...	4	19·5	22·4	22·1
,, ...	Late ...	4	19·2	19·4	20·6
Zealand ...	Early...	2	22·2	21·0	21·9
,, ...	Mid-season ...	4	20·9	18·3	21·2
,, ...	Late ...	4	17·0	18·4	19·5

EXPERIMENT No. III.—SOURCE OF PHOSPHORIC ACID.

Object :—To determine the most economic source of phosphoric acid.

The experiment was carried out on exactly similar lines as in previous years.

The experiment was sown with Federation wheat at the rate of 42 lb. per acre, and the seed was treated with formalin, 1 part in 480.

The experiment was sown on the 18th May, 1913.

Results.

Immediately after germination, and right through the growing period, the plot fertilised with superphosphate looked the best. The plot of Thomas phosphate also looked well from early in the growing period. The other phosphates showed very little effect. The plots were harvested for grain only.

The phosphates, arranged in order of merit, are as follow (the figures in parentheses referring to the percentage value):—

1. Superphosphate (206).
2. Thomas Phosphate (136).
3. Bone-char (135).
4. Rock Phosphate (117).
5. Bone-dust (106).

TABLE V.—Showing the manures arranged in order of merit, as indicated from the experiments for the past four years.

Plot.	Manure.	Yield per acre.	Percentage.
		bus.	
3	Superphosphate, blood, potash ...	25·0	183·8
8	Thomas phosphate ,, ,, ...	18·2	148·0
6	Bone-char ,, ,, ...	16·8	129·2
2	Bone-dust ,, ,, ...	16·8	129·2
5	Rock phosphate ,, ,, ...	14·6	107·4
9	No manure ,, ,, ...	12·5	101·6
	Check plots ,, ,, ...	12·8	100

EXPERIMENT No. IV.—WHEAT MANURIAL TRIAL.

Object:—To determine the effect upon the yield of wheat of the application of simple and mixed fertilisers, when applied at the same time that the wheat is planted, and to soil in which the fertility is kept up by a suitable rotation.

The experiment was carried out on exactly similar lines as in previous years.

The experiment was sown with Federation wheat, at the rate of 42 lb. per acre, and the seed was treated with formalin, of the strength of 1 part in 480.

The experiment was sown on the 27th May, 1913.

TABLE VI.—Showing the manures arranged in order of merit, as the result of four years' experiments.

Hay.

Plot.	Manure.	Average Yield per acre	Percentage.
		t. c. q. lb.	
3	Superphosphate	1 10 1 12	171·4
12	Superphosphate, Blood, Sulphate of Potash ..	1 11 3 17	171·4
9	Superphosphate, Sulphate of Potash .. .	1 11 0 6	160·1
11	Superphosphate, Sulphate of Ammonia, Sulphate of Potash.	1 8 3 0	154·3
6	Superphosphate, Sulphate of Ammonia . .	1 10 2 16	151·8
5	Sulphate of Potash	1 0 1 7	104·1
2	Sulphate of Ammonia	0 16 3 13	101·2
—	Check plots (average)	0 18 1 20	100
8	Sulphate of Ammonia, Sulphate of Potash .	0 19 1 7	95·5

Grain.

Plot.	Manure	Average Yield per acre.	Percentage.
		bus.	
11	Superphosphate, Sulphate of Ammonia, Sulphate of Potash.	21·5	177·7
12	Superphosphate, Blood, Sulphate of Potash .	21·4	171·2
9	Superphosphate, Sulphate of Potash	21·4	171·2
3	Superphosphate...	20·7	167·9
6	Superphosphate, Sulphate of Ammonia	21·7	155·0
5	Sulphate of Potash	14·5	104·3
8	Sulphate of Ammonia, Sulphate of Potash	13·7	103·8
—	Check plots (average)	12·4	100·0
2	Sulphate of Ammonia	9·4	84·7

EXPERIMENT No. V.—FERTILISER TRIAL.

Object:—To determine the chemical needs of the soil by the effect upon the yield of wheat, of the continued application of simple and mixed fertilisers to the same land, and to soil in which the organic matter is kept up by a suitable rotation.

In this experiment all fertilisers are applied to the wheat alone, and none to the rotation crops.

The experiment was carried out on exactly similar lines as in previous years.

The manures, arranged in order of merit, on the year's results are:—

Hay.		*Grain.*	
Sulphate of Ammonia, Superphosphate	... (215)	Superphosphate ...	... (264)
Dried Blood, Sulphate of Potash, Superphosphate	... (213)	Sulphate of Ammonia, Superphosphate	... (198)
Superphosphate ...	... (188)	Sulphate of Potash, Superphosphate	... (183)
Sulphate of Potash, Superphosphate	... (180)	Sulphate of Ammonia, Sulphate of Potash, Superphosphate	... (168)
Sulphate of Ammonia, Sulphate of Potash, Superphosphate	.. (167)	Dried Blood, Sulphate of Potash, Superphosphate	... (155)
Sulphate of Ammonia, Sulphate of Potash	... (102)	Sulphate of Ammonia	... (124)
No manure (*check*) ...	... (100)	Sulphate of Potash ...	... (102)
Sulphate of Potash ...	... (89)	No manure	... (100)
Sulphate of Ammonia	... (66)	Sulphate of Ammonia, Sulphate of Potash	... (88)

The figures in parentheses indicate percentage values, as previously explained.

TABLE VII.—Experiment No. V, showing manures arranged in order of merit, on the results for the past four years.

Hay.

Plot.	Manure.	Average Yield per acre. t. c. q. lb.	Percentage.
12	Superphosphate, Blood and Sulphate of Potash	1 14 0 1	209·3
3	Superphosphate	1 11 0 12	184·5
9	Superphosphate and Sulphate of Potash ...	1 11 1 22	179·1
11	Superphosphate, Sulphate of Ammonia, and Sulphate of Potash.	1 9 2 24	177·0
6	Superphosphate and Sulphate of Ammonia ...	1 9 2 25	168·2
2	Sulphate of Ammonia	0 16 3 3	100·0
...	Check plots (no manure)	0 17 3 21	100·0
8	Sulphate of Ammonia and Sulphate of Potash...	0 17 0 8	95·4
5	Sulphate of Potash...	0 15 1 0	88·1

Grain.

Plot.	Manure.	Average Yield per acre. bus.	Percentage
3	Superphosphate	22·4	172·3
9	Superphosphate, Sulphate of Potash	23 2	170·6
12	Superphosphate, Sulphate of Potash and Blood	23·2	162·8
11	Superphosphate, Sulphate of Ammonia, and Sulphate of Potash.	22·7	162·1
6	Superphosphate, Sulphate of Ammonia... ...	21·1	152·9
5	Sulphate of Potash...	14·4	105·1
2	Sulphate of Ammonia	12·9	104·0
...	Check plots (no manure)	13·5	100
8	Sulphate of Ammonia and Sulphate of Potash...	13·5	99·3

EXPERIMENT No. VI.—FERTILISING THE ROTATION CROP.

Object:—To determine the effect upon the yield of wheat of the application of simple and mixed fertilisers to the rotation crop (Skinless barley); no manure to be applied to the wheat crop.

A bare fallow intervenes between the rotation crop and the wheat crop.

The details of this experiment are the same as for Experiment V, differing only in the size of plots. The experiment was sown with Federation wheat at the rate of 42 lb. per acre, and the seed was treated with formalin—one part in 480.

The experiment was sown on the 27th May, 1913.

The plots were harvested for grain only.

Results.

Plot.	Manure.		Grain Yields.		
			Per Plot.	Per Acre	Percentage.
		lb.	lb.	bus.	
1	No manure (*check*)	...	51·5	8·6	100
2	Sulphate of Ammonia	61	92·5	7·7	97·3
3	Superphosphate	88	99·5	8·3	114·3
4	No manure (*check*)		39·5	6·6	100
5	Sulphate of Potash	30	95·5	8·0	125·6
6	Sulphate of Ammonia Superphosphate	61 88	49	4·1	67·1
7	No manure (*check*)		35	5·8	100
8	Sulphate of Ammonia Sulphate of Potash	61 30	78·5	6·5	102·8
9	Sulphate of Potash Superphosphate	30 88	77·5	6·5	93·7
10	No manure (*check*)	...	44·5	7·4	100
11	Sulphate of Ammonia Sulphate of Potash Superphosphate	61 30 88	74	6·2	87·4
12	Dried Blood Sulphate of Potash Superphosphate	105 30 88	72	6·0	89·6
13	No manure (*check*)	...	38	6·3	100

NOTE.—The 1913 results are the first of this experiment.

MULCHING EXPERIMENTS.

SECTION 1, PLAN 1.

Object:—To determine the best depth to work the fallow land.

The fallows were worked at the following depths:—2 inches, 3 inches, 4 inches, and 6 inches, and one plot was left unmulched. The 3-inch mulch was used as the check plot, and inserted alongside every other plot.

Spring Ploughing.

The land was ploughed with the mould-board plough to a depth of 5 inches during the second week in October.

Working the Fallows.

Immediately after ploughing the ground was harrowed. The fallows were then worked with the skim plough as required during the summer months.

Sowing Experiment.

On 23rd May all plots were sown with Comeback wheat, at the rate of 41 lb. per acre, and with 56 lb. superphosphate per acre. The seed was previously treated with formalin—one part in 480.

SECTION 2, PLANS 1 AND 2.

Object:—To determine the best implement with which to work the fallow when the spring ploughing is done with the mould-board or disc plough.

The following implements were used:—Skim plough, disc cultivator, and the spring-tooth cultivator. The depth of mulching in each case being 3 inches.

Spring Ploughing.

One section was ploughed with the mould-board plough, and the other with the disc plough during the second week in October, 1912, to a depth of 5 inches.

Working Fallow.

The plots were mulched with the respective implements, and to the required depth, during January to April. About the middle of April the disc cultivator was crossed over all the plots to even up the land previous to sowing.

Sowing.

These details are the same as for Section 1, Plan 1.

TABLE VIII.—Showing Summary of Two Years' Results of Mulching Experiments.

Section 1.—Plan 1.

Plot.	Depth of Mulch.	Average Yield per acre.	Percentage.
		bus.	
1 (*check*) ..	Mulched 3 inches deep	19·1	100
2	„ 4 „ „	18·1	94·4
3	„ 2 „ „	18·3	94·4
4 (*check*) ...	„ 3 „ „	19·4	100
5	„ 6 „ „	19 0	98·3
6	Not mulched	12·5	62·1
7 (*check*) ..	Mulched 3 inches deep	19·5	100

Section 2.—Plan 1.—Mould-board Plough.

Plot.	Implement used when Mulching.	Average Yield per acre.	Percentage.
		bus.	
1 (*check*) ...	Skim plough	19·6	100
2	Disc cultivator	19·2	100
3	Spring-tooth cultivator	16·6	89·3
4 (*check*) ...	Skim plough	18·1	100

Section 2.—Plan 2.—Disc Plough.

Plot.	Instrument used when Mulching.	Average Yield per acre.	Percentage.
		bus.	
1 (*check*) ...	Skim plough	18·9	100
2	Disc cultivator	18·5	98·5
3	Spring-tooth cultivator	16·0	86·1
4 (*check*) ...	Skim plough	18·6	100

Section 3, Plans 1 and 2.

Object:—To ascertain the best time of the year to commence working the fallows, using the skim plough and the disc cultivator for forming the mulches.

Spring Ploughing.

The ploughing for this experiment was done with the disc plough, to the depth of 5 inches during the second week in October.

Working the Fallows.

The various times to commence working the plots should have been as follows:—Immediately after ploughing, November, December, January, and just prior to sowing.

Owing to conditions not being suitable, the plot which ought to have been mulched immediately after ploughing was not mulched till January, and owing to harvest being in full swing during November and December, it was found impossible to work the fallows during those months; these plots were therefore left until February and March respectively, the January check plots being mulched according to the plan.

The sowing details were the same as for Section 1, Plan 1.

Table IX.—Showing results of Mulching Experiments. Section 3 (Area of plot, ⅓ acre).

Section 3, Plan 1. Skim plough used for mulching.

Plot.	Cultivation commenced.	Yield.		
		Per Plot.	Per Acre.	Percentage.
		lb.	bus.	
1 (*Check*) ...	January	347	17·3	100
2 ...	January*	335	16·7	97·6
3 ...	Just prior to sowing	272	13·6	80·2
4 (*Check*) ..	January	335	16·7	100
5 ...	February	322	16·1	95·7
6 ...	March	304	15·2	90·0
7 (*Check*) ...	January	339	16·9	100

* See note on following page.

Section 3, Plan 2. Disc cultivator used for mulching.

Plot.	Cultivation commenced.	Yield.		
		Per Plot.	Per Acre.	Percentage.
		lb.	bus.	
1 (*Check*) ...	January	349	17·4	100
2 ...	January*	332	16·6	95·3
3 ...	Just prior to sowing	261	13·0	75·2
4 (*Check*) ..	January	346	17·3	100
5 ...	February	315	15·7	93·1
6 ...	March	279	13·9	84·3
7 (*Check*) ...	January	323	16·1	100

* As explained above, this should have been mulched directly after ploughing, but could not be done till January.

The results show that the earlier one commences to work the fallow the better the result.

FUNGICIDE EXPERIMENTS.

Preparation of Solutions.

Bluestone.—A $1\frac{1}{2}$ per cent. solution was prepared by dissolving $\frac{1}{2}$ lb. of bluestone in $33\frac{1}{3}$ lb. of water. This was diluted with water for the weaker solutions.

Formalin.—A solution of $\frac{1}{8}$ per cent. was prepared.

Limewater.—Made by placing a quantity of unslaked lime in a vessel, and pouring water over it; when cold, and the solution clear, the wheat was dipped in it.

Qua-sul.—1 quart to 50 gallons of water, and wheat soaked for five minutes.

Corvusine.—Used as recommended by the proprietors. (The grain thoroughly moistened with the mixture, and sown immediately.)

Rustmut.—4 oz. of preparation used to every bushel of wheat. The preparation required for use was dissolved in enough boiling water to cover; allowed to stand three minutes, then enough cold water added to cover wheat required for sowing; poured over wheat, and soaked for seven hours; wheat drained for three hours, then sown immediately.

Copper Carbonate.—

(*a*) 1 oz. copper carbonate in 5 lb. water; soaked for two minutes.

(*b*) 1 oz. copper carbonate in 10 lb. water; soaked for three minutes.

Infecting Seed with Bunt.

Prior to treating with the above fungicides, the seed was well covered with bunt spores. This was done by crushing up a quantity of bunt balls, and thoroughly mixing it with the seed to be treated.

Method of Sowing.

Three varieties of wheat were chosen for these tests, and 100 grains of each were sown. The varieties were:—Federation, Comeback, and Bobs. Rows of untreated and uninfected seed were planted.

TABLE showing Results of Fungicide Experiments.

Seed treated 9th—11th June, 1913. Seed sown 12th June, 1913.

Treatment of Seed.	Federation.			Comeback.			Bobs.			Average		
	B	C	G	B	C	G	B	C	G	B	C	G
Untreated, uninfected	0	73	77	0	73	77	0	72	74	0	72·7	76
Formalin ⅛ per cent., dipped for 5 minutes	1	81	83	3	78	82	1	69	74	1·6	76	79·6
Bluestone 1½ per cent. solution, dipped 3 minutes, then dipped in limewater for a few seconds.	34	50	86	16	68	83	19	61	81	23	59·6	83·3
Bluestone 1 per cent., soaked 5 minutes, then dipped in rain water 5 minutes .	16	71	89	13	65	80	18	60	80	15·6	65·3	83
Bluestone ¼ per cent solution, soaked 5 minutes, then dipped in limewater 5 minutes.	38	41	84	12	76	90	27	45	77	25·6	54	83·6
Bluestone ⅓ per cent. solution, dipped 5 minutes	22	64	90	16	72	91	20	62	80	19·3	66	87
Qua-sul 1 quart in 50 gallons water, soaked 5 minutes . . .	57	12	73	51	31	83	49	26	75	52·3	23	77
Corvusine, grain moistened with mixture	0	62	65	8	50	58	0	33	35	2·7	48·3	52·6
Rustmut, prepared as directed	16	68	86	4	87	91	6	68	76	8	74·3	84·3
Copper carbonate, 1 oz. in 5 lb. water, soaked 2 minutes	4	78	86	3	85	89	0	79	81	2·3	80·6	85·3
,, ,, 1 ,, 10 ,, ,, ,, 3 ,, ...	10	71	82	4	82	89	4	67	72	6	73·3	81

NOTE :—B—Bunty plants. C—Clean plants. G—Germination.

The Narara Viticultural Station.

P. G. GILDER.

Nurseryman-in-charge, David Jenkins.

ALMOST encircled in an amphitheatre of protecting hills of an altitude of from 200 to 300 feet, and open only to the east to welcome the rays of the morning sun, lies the Narara Viticultural Station, which has made a most hopeful beginning in the raising of phylloxera-resistant stock for reconstituting vineyards.

The site has many advantages for such a purpose. In addition to the magnificent shelter from the devastating westerlies afforded by the neighbouring hills, it has a deep, sandy, friable, naturally well-drained soil, sufficiently supplied with humus to retain moisture easily. The soil itself is the result of the weathering agencies on the surrounding sandstone hills contributing to the accumulations in the narrow valley below.

A further decided advantage is its accessibility, being only 3 miles from Gosford Station, with its excellent train service, and 1 mile from Narara goods depôt, entailing but a short trip for the carriage of cuttings and supplies.

The Necessity for a Change of Site.

The failure of the Hunter River Viticultural Station at Raymond Terrace to come up to Departmental requirements made the selection of a new site absolutely necessary. During the year 1912–13 the weather conditions there were such as to make nursery work impossible. The hot, westerly winds, together with blinding sand blizzards in the three spring months, worked disaster among the grafts, and of the 114,000 cuttings of phylloxera-resistant stocks which were bench grafted, only between 2,000 and 3,000 were sufficiently good to be available for distribution. 75,000 resistant vines not suitable for grafting were planted out in the nursery, but the results were equally unsatisfactory. The whole figures were a repetition of what had occurred during the previous two years.

The Hon. J. L. Treflé, M.L.A., while Minister for Agriculture, therefore decided in 1912 that operations must be transferred to a more suitable site. With this object in view, several sites were inspected, but none of them was found to be quite suitable.

Early in 1913, however, the Forestry Department decided to resume 100 acres of land at Hogan's Brush, near Gosford, for forestry purposes, and the Minister appointed a committee to inspect and report upon its suitability for a viticultural station. The committee consisted of Messrs. George Valder, Acting Under-Secretary and Director of Agriculture; M. Blunno, Viticultural Expert; W. J. Allen, Fruit Expert; A. Gollan, Superintendent of planting,

Forestry Department; and David Jenkins, Nurseryman-in-charge, Hunter River Viticultural Station. This committee reported favourably on the area, and as the Forestry Department was quite willing to allow the Department of Agriculture to occupy portion of the area to be resumed, the Minister, on 8th May, 1913, approved of operations being transferred from Raymond Terrace to the new site.

The New Site.

Of the 100 acres in the area, 15 are eminently adapted for nursery work, 45 are somewhat more suited to the growth of mother vines and fruit trees generally, and the balance is hillside, which will be utilised by the Forestry Department.

A glance at the Table of Analyses of five samples of the soils will confirm what has already been said with regard to their desirable characteristics for viticultural purposes. The capillarity ranges from good to excellent, and the sand content, with but one exception, is above 70 per cent. They can be taken as deep sandy soils, well drained, sweet, and of reasonable fertility. The presence of the humus tends to bind the particles together, making it possible to store up a large amount of moisture, and also materially reduces erosion by the winds.

Altogether it may be said that all the soils are in a good physical condition, and thus enabled to readily yield their fertility to the recently made grafts.

The Beginning of Operations.

Operations were started on the 5th August, 1913, and a task of herculean proportions confronted the manager and his staff to bring the ground into even an approximately suitable condition for propagating purposes without the loss of a season. How well they have succeeded it will be the purpose of both photograph and description to indicate.

The soil was originally heavily timbered with turpentine, swamp mahogany, red mahogany and blue gum, and there are still ample evidences of the size of the forest giants in the shape of huge stumps such as the one illustrated.

Odd patches of previously cleared land had to be selected here and there to afford room for the nursery, leaving the larger stumps to be removed as time and circumstances permitted. With valuable grafted vines and cuttings in close proximity, it is obviously unsafe to use explosives to shatter these stumps, and this must, therefore, be postponed till after the transfer of the season's output.

Results to Date.

A total of 6 acres has been put under vines this season, and these include about 100,000 phylloxera-resistant rootlings and 35,000 grafted vines for sale for direct planting out in the vineyard.

Practically the whole of the grafted vines have been ordered years ahead, and thus there are very few available this winter, but it is evident that in a few years, favoured with success similar to that already achieved, the demand will be overtaken. One grower ordered 12,000 grafted vines for

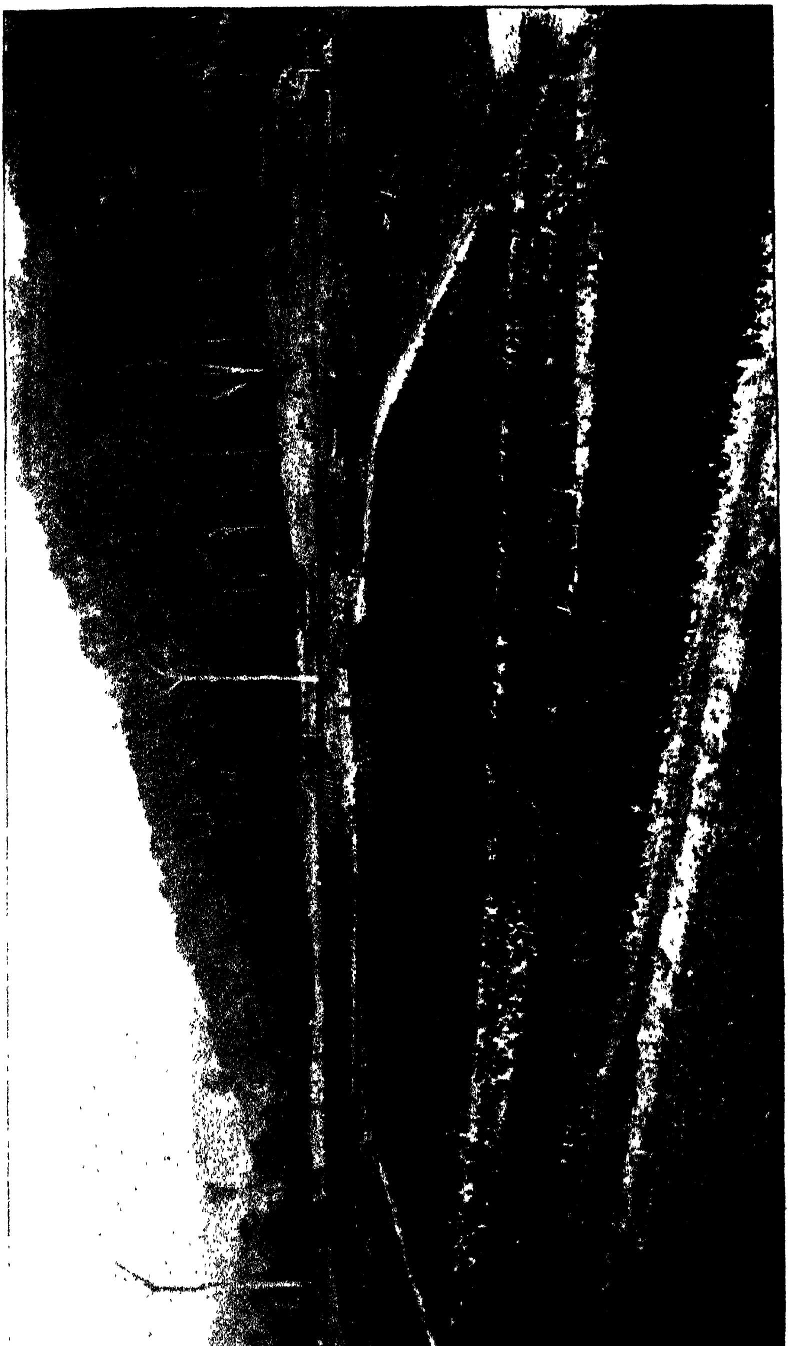


Fig. 1.—General View of Nursery.

NARARA VITICULTURAL STATION.

Fig. 2.—A Stump ready for shattering by explosives (see opposite page).

Fig. 3.—A Typical Stump, measuring 15 feet across where the roots have been cut. The darkened portion indicates the size showing above the ground.

Analyses of Soils from Narara Viticultural Station.

Soil No.	No. 1. Topsoil.	No. 1. Subsoil.	No. 2. Topsoil.	No. 2. Subsoil.	No. 3. Topsoil.	No. 3. Subsoil.	No. 4. Topsoil.	No. 4. Subsoil.	No. 5. Topsoil.	No. 5. Subsoil.
Colour	Grey.	Grey.	Greyish Brown.	Greyish Brown.	Greyish Brown.	Greyish Brown.	Greyish Brown.	Greyish Brown.	Grey.	Grey.
Reaction	Faintly acid.	....	Acid.	...	Strongly acid.	.....	Strongly acid.	......	Faintly acid.	......
Water Capacity (per cent.)	39 Fair.	....	39 Fair.	....	45½ Good.	.....	55 High.	.....	40½ Fair.	......
Absolute weight in lb. per acre, 6 inches deep	1,832,910	......	1,832,910	.....	1,629,253	......	1,595,311	......	1,832,910	......
Capillary Power (inches in 3 hours)	9¾ Excellent.	......	6¾ Good.	....	6¼ Good.	......	7¾ Very good.	.....	9¼ Excellent.	......
Root Fibres (per cent.)	·50	·00	·45	·00	·30	·00	48	·15	·20	·00
Stones over ½ in. diameter (per cent.)	·00	·00	·00	1·50	·00	·00	·00	·10	·00	·00
Coarse Gravel, more than $\frac{1}{8}$ in. in diameter (per cent.)	·49	·45	·75	·26	·00	·00	·00	·00	·26	·13
Fine Gravel, more than $\frac{1}{10}$ in. in diameter (per cent.)	4·23	5·56	6·00	5·95	1·62	1·62	·70	2·03	5·48	5·69
Fine Soil: Sand (per cent.)	80·03	83·30	75·73	78·16	67·13	70·80	76·16	74·66	76·50	75·00
Fine Soil: Clay (per cent.)	14·75	10·69	17·07	14·13	30·95	27·58	22·66	23·16	17·56	19·18
Moisture (per cent.)	·95	......	1·10	......	2·50	......	2·90	......	1·50	......
Volatile Matter (per cent.)	2·10	.....	2·92	......	6·92	......	6·82	......	2·77	......
Nitrogen (per cent.)	·084 Fair.	.....	·126 Satisfactory.	......	·119 Satisfactory.	......	·210 Good.	......	·098 Fair.	......
Soluble in hot Hydrochloric Acid: Lime (CaO) (per cent.)	·14 Satisfactory.	......	·10 Satisfactory.	......	·085 Fair.	.....	·14 Satisfactory.	......	·13 Satisfactory.	......
Soluble in hot Hydrochloric Acid: Potash (K_2O) (per cent.)	·038 Indifferent	.....	·044 Indifferent	......	·05 Fair.	......	·077 Fair.	......	·036 Indifferent	......
Soluble in hot Hydrochloric Acid: Phosphoric Acid (P_2O_5) (per cent.)	·054 Fair.	......	·073 Fair.	.....	·102 Satisfactory.	......	·076 Fair.	......	·051 Fair.	......

the current year, and has no fewer than 40,000 on order, while others have been waiting for some years for their requirements to be supplied. Sympathetic consideration is being given to the needs of all the applicants in apportioning the number available.

The phylloxera-resistant rootlings will be available for sale, and it is worthy of note that in South Africa many of the vignerons undertake their own grafting by establishing a plantation of about 100 mother-resistant vines, and in their spare time bench-graft to the required European varieties. These are set out in a small nursery where they can receive the necessary attention, and then planted out in their final locations during the following year. The vineyards are thus reconstructed at comparatively little expense, and there seems no reason why this should not be carried out in our own State, especially when it is understood what a simple process bench-grafting is.

The Necessity for Reconstruction.

The severe setback received by the viticultural industry of this State in consequence of the outbreak of phylloxera in some of the districts called attention to the use of resistant stock as a curative measure in infected districts, and as a preventive in areas not yet attacked. To this outbreak must be attributed the present stationary condition of both wine and table grape production, but there is every prospect that with resistant vines easily available viticulture will assume its rightful place among our primary industries. The limitations to the purchase of the necessary grafts which have existed in the past are now being rapidly removed. Already in the counties of Cumberland and Camden the effects of the use of resistant stocks are evident in improved yields, and there is satisfactory proof that the use of such stocks occasions no diminution in cropping capacity.

The Choice of a Stock.

Some discrimination is needed in selecting the particular stock, and by a gradual process of elimination the most suitable stocks for the various classes of soil, as well as for the different varieties of grape, have come to the front.

Five main factors may be mentioned as having to be taken into consideration.

1. *Resistance to Phylloxera.*—The various American vines and their hybrids differ widely in this characteristic, as will be seen when reference is made to the stocks now being grown at Narara.

2. *Affinity with the Scion.*—A harmony of growth has necessarily to exist between stock and scion. In some cases the stock will be too weak to sustain the growth and cropping power of the European vine, whereas in others the stock may be altogether too vigorous, and outgrow the scion.

3. *Suitability to the Particular Class of Soil.*—Remarkable differences occur in this respect, and only experience of other countries and experiment in our own State can result in adequate knowledge on this aspect of the question.

Fig. 4.—The Stump shown in Fig. 2 shattered by explosives.

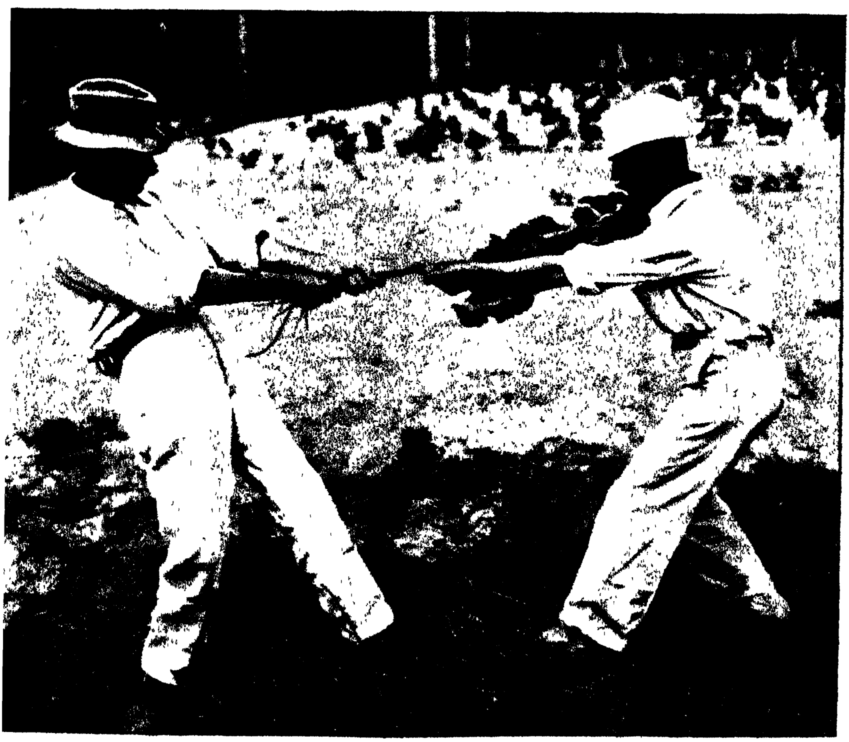


Fig. 5.—A good test of the union between Stock and Scion. Twelve weeks after Grafting.

NARARA VITICULTURAL STATION.

Fig. 6.—Showing growth of Grafts (in some instances 56 inches) twelve weeks from Planting.

Fig. 7.—A vigorous Corn Crop.

NARARA VITICULTURAL STATION.

4. *Resistance to Chlorosis, Anthracnose, etc.*—It is evident from experiments already made that certain varieties of European vines are less subject to disease when grafted on some resistant stocks than on others.

5. *Effect on the Cropping Power of the Scion.*—It has been noted that this varies with some of the resistant stocks.

The Method of Grafting.

Remarkable results have been obtained from the system of bench-grafting in use at Narara. The same system was adopted at Raymond Terrace, but it never had a fair trial there owing to the extremely unfavourable climatic and soil conditions.

The method is to use an ordinary cutting of the resistant stock, bench-graft it to the selected scion by means of a whip-tongue graft, and then plant out direct into the nursery, without "Callusing," a procedure in vogue in older lands. According to theory, this callusing is imperative, but in practice, owing to the genial climate, and friable, moist soil at Narara, it can be dispensed with, and much time and expense obviated. In other words, a sympathetic co-operation with the forces of Nature enables the nurseryman to avoid the use of what is considered absolutely necessary in less favoured lands.

To the outsider, a growth of nearly 8 feet on two canes to be made within five and a half months from a bench-graft of an unrooted cutting must be considered almost phenomenal, and when to this is added the information that within three months of grafting, two incredulous officers of the Department found it impossible to pull scion from stock, so perfect was the union, what further proof is needed of the success of the method?

The whip-tongue graft is by no means difficult to make, and the work was carried out by inexperienced men and boys. In a short time, the former were able to make 1,000 grafts a day, and the boys from 600 to 800. Are not our vignerons capable of following this example in their own vineyards?

The grafts were made in September, October, and early November, and were planted out in rows 3 feet apart, and about 3 inches apart in the row. The soil is heaped right over the graft to keep it moist till growth begins. Precautions have to be taken to prevent the scions from rooting, and here Mr. Jenkins has an improvement on the old method. Instead of disrooting the vines by means of the knife, a costly, tedious, and cumbersome process, the soil is carefully removed, and the white shoot of each root, picturesquely known as a "snail's horn," is rubbed off about two or three weeks after planting out. This has the chief merit of preventing any check to the growth of the scion, and ensures that all the root activity emanates from the stock from the very outset.

Precautionary Measures.

Though there is at all times an unavoidable danger of the spread of phylloxera to unaffected areas, every care, as far as possible, has been taken to ensure that it shall not find its way into the new nursery. In consequence of this, every cutting from the Howlong Viticultural Station

has been subjected to a necessarily drastic disinfection. This, coupled with a long railway journey, has tended to keep on the low side the percentage of grafts which have "taken" when Howlong wood has been used. Even with this handicap, over 50 per cent. of the grafts have been successful, while the percentage has been as high as 70 when the cuttings from Raymond Terrace were available. In a year or two, when the mother plantation of resistant stocks is in full bearing at Narara, there will be no necessity to call upon Howlong for supplies, and the average of takes will be considerably higher.

The Immunity of Sandy Soils to Phylloxera.

Apart from the desirability of having deep, sandy, friable soil for nursery purposes, we have the established fact that certain sandy soils are immune to phylloxera. This would afford additional protection at Narara if this dread disease were to spread to this locality.

Investigations in France and Italy, where the whole question has assumed a life-and-death aspect to many communities, have shown that where clay and sandy soils are close together, the former become infected, whereas the latter escape, and in plantations where the clay and sand were mixed, the vines resisted more or less according to the relative proportions of the two ingredients, the larger the proportion of sand the greater the resistance.

The accepted theory is that this faculty of sandy soils is due to the greater capillarity and permeability to water. Sandy soils which are apt to get too dry, either because the rainfall is scarce, or because there is no water relatively close to the surface, have no such immunity. The propounder of this theory, Vannucini, of Italy, measured the interstices between grain and grain in a suitable sandy soil, and found that the space was sufficient for young phylloxera to move in, but when it reached its adult stage, it would be closed in on all sides. If then a supply of moisture rose from the lower layers or came from the surface by rain, the small aphis would find itself enveloped by a thin film of water, and its respiration is endangered.

This theory is corroborated by the application, in some parts of the world, of that peculiar remedy to eradicate phylloxera from a vineyard, *i.e.*, the submersion of the vineyard for from six to nine weeks in winter time, keeping a layer of water 8 to 10 inches high without interruption, and repeating the process every year.

Suitable Stocks.

Among the stocks which have been found most suitable at Narara are the following :—

Mourvèdre x Rupestris, 1202, has given the best results in percentage of takes, and also in growth, especially when used as a stock for the Muscats, which are usually somewhat difficult to take. It does well in rich, deeply trenched soils, whether sandy, clayey, or even with a large percentage of lime.

Aramon Rupestris Ganzin, No. 1, does not give the same success in grafting as the former, but the vines which do take make such a perfect union that it could scarcely be improved upon. It roots easily, and is eminently suitable for table varieties, especially the Muscats.

Rupestris du Lot has shown itself especially suitable for wine grapes in most classes of soil. It roots freely, and is easily grafted both in the nursery and at the bench. It develops equally in size with the scion, and has the big advantage of being one of the most resistant to phylloxera. It cannot be recommended for growing under irrigation, as it is so vigorous that it would tend to grow foliage at the expense of fruit.

The Riparia Rupestris crosses 3309, 3306 and 101^{14} have all done well at Narara.

Riparia Gloire de Montpellier is also satisfactory in many respects, but the scion has a tendency to outgrow the stock.

Riparia x Cordifolia 106^{8} is very suitable for bench-grafting, and takes well in the nursery, producing a vigorous growth. It is totally unsuited to soils rich in lime, as it is affected by chlorosis. It will, however, thrive in a dry clay soil, even where big cracks form in summer.

Chasselas Berlandieri 41^{B} takes very well, and will grow where few others will. Its growth from the stock is not very vigorous for the first year or two, but it improves very considerably as it grows older. It is resistant to chlorosis and thrives in lime soils.

A recent introduction to the State is Vinifera x Cordifolia x Rupestris 62^{66}, which was obtained from Victoria. Mr. Jenkins has considerably increased his numbers of this stock by propagating from "eyes" in pots. It partakes largely of the Rupestris characteristics, and is eminently suitable as a stock for Muscats and other grapes which make notoriously bad scions.

Other Crops.

While the primary purpose of the station is to be a nursery, it is obvious that its suitability for the growing of its own horse-feed will add to its value, in tending to make it self-contained. The crop of Funk's Yellow Dent maize, which we are able to illustrate, was a picture of healthy growth, despite the unfavourable season with a rainfall of but 83 points in October, 110 in November, 65 in December, and 78 in January, while the photograph was taken in the middle of January. Many of the stalks were 12 and 13 feet high, and an inspection in March proved that the crop of grain would be very satisfactory.

In the patches at present uncultivated paspalum was 3 and 4 feet high at the time of the visit, and so luxuriant was the growth that it might almost be classed as a weed from a nurseryman's point of view.

Conclusion.

It is evident from even a hasty examination of the results achieved, and of the practically certain prospects of the nursery, that the question of supplying resistant stocks is well on its way to a satisfactory solution. The site is excellent for the purpose, and its few drawbacks are far more than compensated by its many outstanding advantages. The manager and his staff are to be congratulated on the way in which they have co-operated with the Department in grappling with a serious problem, and there is every indication that all wants with regard to phylloxera-resistant stocks, at any rate in connection with coastal vineyards, will speedily be met.

Kia-Ora Peach Tree, Hawkesbury Agricultural College.

THE KIA-ORA PEACH.

THE Kia-Ora peach is a very regular bearer, proving suitable on the coast, in the dry inland districts, and under irrigation. It is less subject to leaf-curl than most others. It is a large, yellow-fleshed variety ; the fruit is of excellent flavour, and a freestone. It ripens about the middle of January and requires to be handled carefully, as it is not a first-class carrying peach. It is suitable for dessert, drying, or canning.

Shape.--Slightly oval from base to apex.

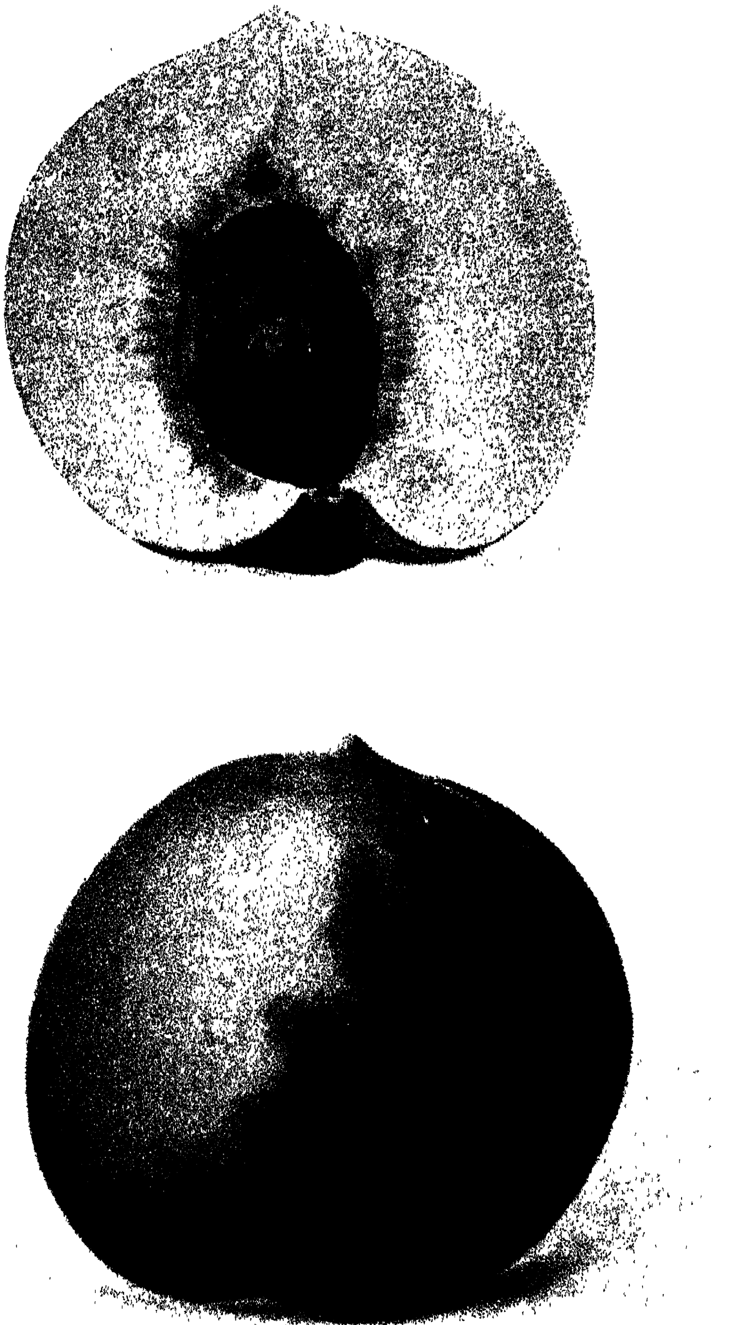
Apex.—Prominent.

Suture.—Fairly deep, extending half way-round ; fruit fuller behind suture than in front.

Colour.—Skin yellow splashed, and stained with crimson.

Flesh.—Deep yellow, with crimson stain at stone ; rather dry in texture.

Tree.—Upright, moderate grower ; very much like Elberta ; leaves large ; kidney-shaped glands.



PEACH

Onion Culture.

A CORRESPONDENT at Cowra recently inquired for particulars concerning onion-growing, with especial reference to the class of soil required, the time of planting, the labour requirements during growth, and the yield that could be expected.

In reply, Mr. A. J. Pinn, Inspector of Agriculture, stated that the soil and climate of the Cowra district should be eminently suitable for onion-growing. The time of growing varies with each district, and it is wise to make inquiries and follow the practice of successful growers in the locality. It is probable that May will be found a good month for sowing. The crop occupies the ground for a period of about seven to ten months, according to the variety.

The best soil is a moderately light loam, deep, well drained, and fertile, which can be readily worked, cleaned, and rendered firm without becoming consolidated. The cultivation of the crop is not recommended in very heavy land. Soils with an abundance of decomposed vegetable matter will be found eminently suitable. The situation of the land must be open and sunny, and should be fairly free from weeds so as to avoid expense in clearing.

The soil should be prepared as early as possible, and all weed-growth destroyed, as weeds are the greatest trouble in the growing of onions. The ground, having had a thorough preparation, should be firmed for the reception of the seed. The seed should be sown ½ inch to 1 inch deep in drills 15 inches apart. As soon as it can be ascertained which are the stronger plants, they should be thinned out to from 4 to 6 inches apart in the drill.

The subsequent treatment of the crop will require close attention to keep down weeds and preserve a loose surface mulch. The intertillage of the crop is usually done with hand-wheel hoes, and should commence as soon as the young plants can be plainly seen. At the same time the crop should be gone through with small triangular hand hoes (onion hoes), and all weed growth between the plants destroyed.

The quantity of seed required when drilled is 2 to 3 lb. per acre.

Good varieties are—

Early.—Silver Skinned, Extra Early Globe.
Mid-season.—Brown Globe.
Late or Main Crop.—Brown Spanish.

Transplanting is favoured by many, and where this method is adopted the plants should be transplanted (about June) from the seed-bed to the required distance when about 4 inches high. The first leaves generally die away,

but if planted in cool moist weather, the plants will soon become established. This method is more costly than any other, but has the advantage of ensuring a clean field at a later period in the growth of the crop.

When the tops have withered the bulbs should be lifted, the plants being pulled by hand, three or four rows being made into one windrow. They should be allowed to remain in the sun for from five to seven days, the length of time depending on the weather; but they should not be allowed to scald. Before bagging, the tops and roots should be trimmed off, this being usually done with sheep shears, care being taken not to cut the tops too close to the bulb. The usual length is 1 inch from the bulb. The storage of onions is best effected by keeping in onion cases, and storing in a well-ventilated shed.

Under fair conditions a yield of from 4 to 6 tons per acre can be expected.

It is impossible to give an estimate as to the probable profits, as so many causes operate to determine this, depending chiefly on the season, soil, and the grower; but it can be said that the crop is much neglected in this State, and is always likely to be a payable proposition when properly looked after, in so far that large quantities have to be imported from other States to supply our own requirements.

Insects and Diseases.

The worst insect pest is the onion maggot. The maggots come from the eggs deposited on the plant, and require about a week to hatch; the larvæ burrow into the bulbs and remain about two weeks, then emerge and pupate in the ground. The first indication of their presence is that the tops turn yellow in colour, wither, and finally dry before the bulbs have matured. It is difficult to suggest a remedy, but liming the soil is found to be beneficial.

Another disease to attack onions is Onion Smut. It attacks the young plants, causing dark spots on the leaves. As the onion develops these spots crack open, exposing a black powder which contains the spores of the fungus. If very severe it causes the tops to die, and often spreads to the bulbs. If the disease shows signs of spreading, all infected plants should be pulled up and burnt at once. Dusting with lime is recommended. All tops should be burnt after harvesting. Rotation of crops is the most effective remedy.

Brown Olive Scale on Passion Vines.

In answer to a correspondent, the Fruit Expert states that it is extremely difficult to reach scale on passion vines, as the growth is usually so dense; at any rate it is almost impossible to reach every portion of the vine. If the vines are in condition, resin wash can be applied, but it may require several applications to cleanse the vines. The best time to treat the vines is just after they have been pruned in November, when the scale are more easily got at. To grow passion-fruit profitably it is necessary to heavily manure the vines and to work the soil well.

The Peach Tip Moth.

FAMILY TORTRICIDÆ.

WALTER W. FROGGATT, F.L.S., Government Entomologist.

ABOUT four or five years ago the owners of suburban gardens and many of the orchardists between Sydney and the mountains, in what we might call the Metropolitan orchards, noticed that the luxuriant tips of the foliage of the peach and nectarine trees were being attacked by some tiny grub that burrowed into the side of the tip, and eating its way downward caused the terminal leaves to die back and the top of the injured twig to gum. Sometimes nearly every shoot was attacked in this manner, and the otherwise healthy tree would have the tips of every branchlet tipped with a tuft of dead leaves.

Later on in the season it was found that a large percentage of the fruit was marked with several blotches, covered with exuding gum, under which some insect had gnawed through the skin. Careful search through the infected twigs and fruit showed that a large number of the grubs or caterpillars died or disappeared before they had done much actual damage to the trees, but the injured fruits were spoilt for market. Eventually a few specimens were obtained, which proved that the creature doing the damage was the caterpillar of a small *Tortricid* moth, not unlike the well-known codlin moth, both in the larval and perfect states. The damage done to the surface of the fruit is more serious than that to the twigs, for it causes large scars to form before the fruit is ripe.

Life History.

The eggs are laid on the tips of the peach shoots, where the tiny grubs hatch out and burrow into the tip, gnawing a hole down the centre and causing the two or three terminal leaves to die back. A badly-infested tree in early summer may have every other twig thus checked Very often these tips, when examined, contained no caterpillar, but were often encrusted with a globule of gum.

At first some of the orchardists called them "summer pruners," and considered they did very little harm to the trees. Later on, however, it was found that they attacked the fruit, and caused it to gum in a similar manner.

The Caterpillar is four-tenths of an inch in length, cylindrical, slightly thickened in the centre, and tapering to the extremities; furnished with three pairs of slender legs, four pairs of prolegs, and two stout anal claspers. The head is dull-yellow, with black indistinct eye spots, mouth parts black antennæ small; thorax and abdomen pale reddish-pink on dorsal surface lighter on the ventral surface; anal extremity yellow.

The Pupa is three-tenths of an inch in length, cylindrical, contracted at the head, with each of the segments from behind the head ringed with a ridge of fine spines, forming a round ring at the anal tip. The caterpillar forms a flimsy cocoon of loose silken fibre, not unlike that of the codlin moth grub.

The Moth measures just under half an inch across the outspread wings, but when at rest usually has the wings folded flat down on the sides. General colour dark-brown, mottled on the fore wings with fine grey scales, forming a slight pattern on the front margin; hind wings lighter, tinted silvery, and fringed with fine hairs; antennæ, face, and legs covered with grey scales.

The Trees Attacked.

In the first instance this is a peach pest, but Mr. Fruit Inspector Gallard, who has paid considerable attention to this moth, finds that the larvæ attack a number of different fruits in the Metropolitan area. He has found quinces and apples into which they bore distinct circular holes, and gnaw irregular tunnels through the tissue, but do not work into the centre for the core, like the codlin moth.

Mr. Gallard found that he could capture the adult caterpillars and pupæ under bandages round an infested tree, in the same manner that the codlin moth is taken on the trunks of apple and pear trees.

Remedies and Preventives.

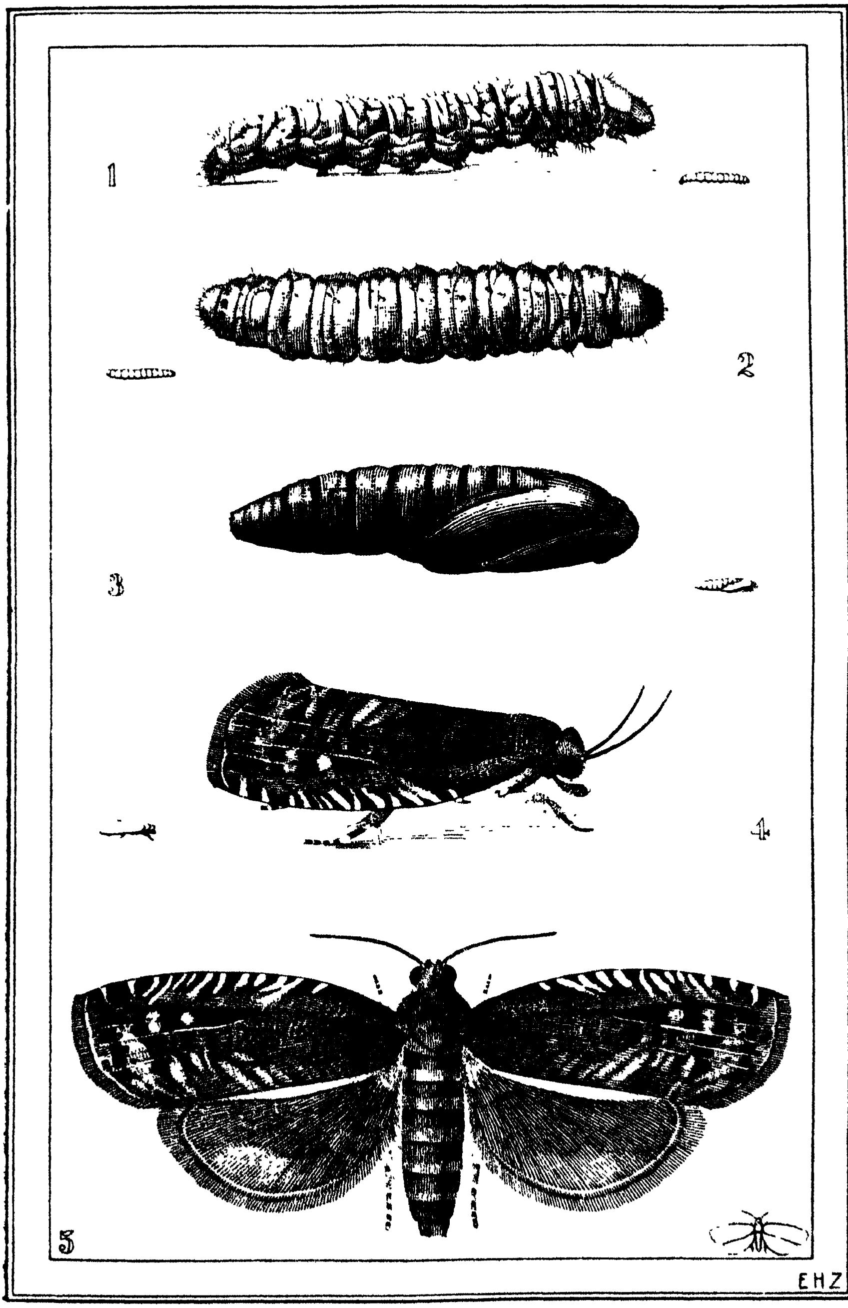
The chief damage done is the boring into the skin of the young fruits and causing them to gum, the resulting scar caused by the grub spoiling the fruit for market. The thorough spraying of all peach trees in the early summer, as soon as the first sign of damaged peach tips are noticed, should prove effective, and arsenate of lead would be the best mixture to use for this purpose. In small gardens and orchards, bandaging should be very effective in cleaning up the orchard, but it must be remembered that the larvæ have done most of the damage to the peach tips or the fruit before they seek shelter.

Determination.

This small moth has not yet been determined, but it belongs to the Family *Tortricidæ*, which contains the codlin moth and a number of other destructive moths, which damage fruit and cultivated plants whilst in the caterpillar stage.

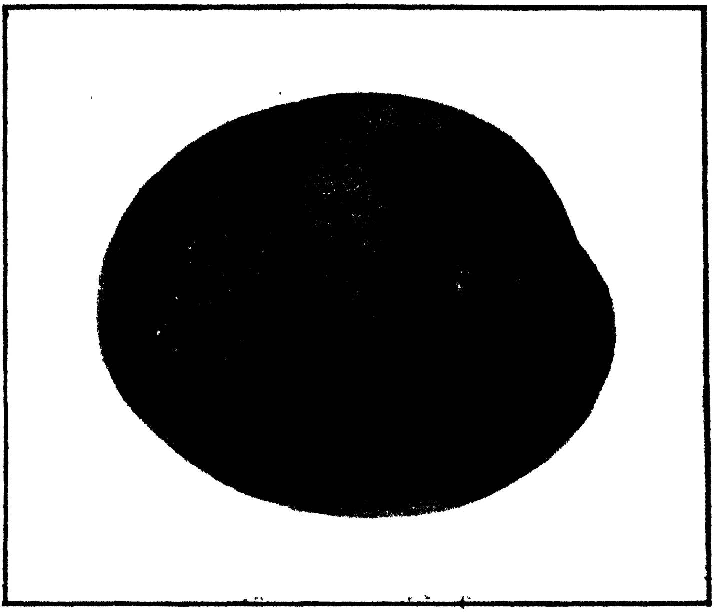
PEARS FOR THE ALBURY DISTRICT.

A CORRESPONDENT from Lavington, *via* Albury, recently asked whether the "Idaho Pear" was recommended for planting. In reply, Mr. W. J. Allen, Fruit Expert, stated that he considered other varieties better suited for planting in the district, viz.: Packham's Triumph, Josephine de Malines, and Williams, all of which would be found more profitable.

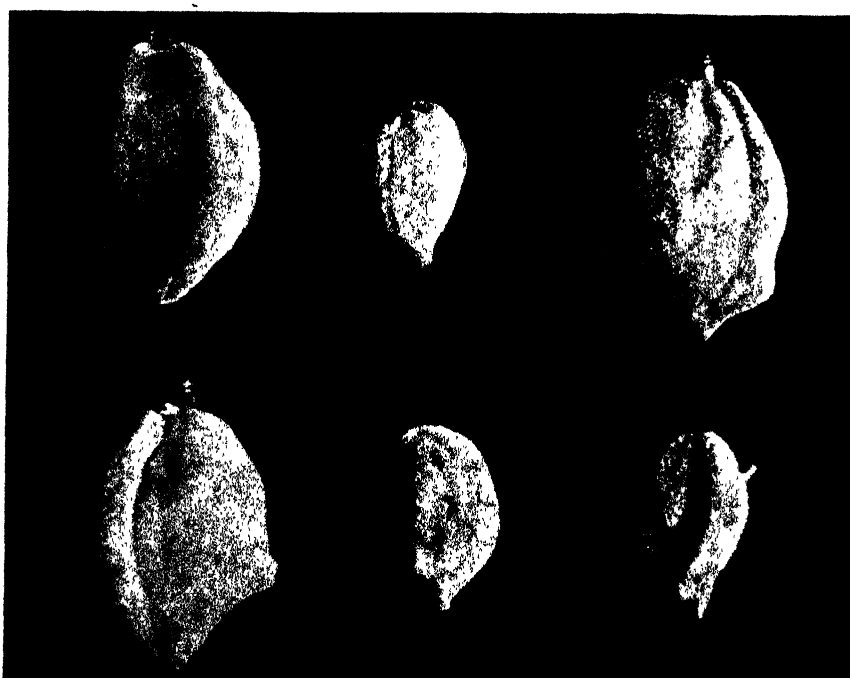


1. Side view of larva.
2. Upper surface of larva.
3. Pupa, side view.
4. Side view of Moth.
5. Moth with wings expanded.

PEACH TIP MOTH.



Peach damaged by Larva of Peach Tip Moth.



Showing Young Peaches damaged by Peach Tip Moth.

PEACH TIP MOTH.

Smaller Tips damaged.

Tips of Branchlets of Peach Tree damaged by Larvæ.

PEACH TIP MOTH.

Wollongbar Experiment Farm.

Winter Fodder Trial, 1913.

J. G. McMILLAN, Manager.

This was a repetition of the trials, 1912. Object, to determine the most suitable green feed for winter feed. Seed sown, 10th May; superphosphate at the rate of 21 lb. per plot, the latter being ¼ of an acre in extent.

Very heavy rains fell immediately after the crops were put in, and it was therefore impossible to harrow them sufficiently, thus resulting in loss of seed and poor germination. The weather was very cold, and the wet soil was practically waterlogged until middle of July. This acted detrimentally to the growth.

Plot No.	Crop	Yield per Acre. t. c. q. lb.	Remarks.
1	Thew wheat	3 1 3 4	About 2½ feet high; nice appearance as regards colour; free from rust.
2	Huguenot wheat	2 3 1 16	A poor crop; appearance green, but stunted.
3	Algerian oats	4 2 2 0	A fairly thick growth; free from rust, but flags blighted badly.
4	Black winter rye ..	8 12 3 11	A good mat of food very suitable for grazing; nice green colour, showing no rust or decayed flags.
5	Cape barley	5 2 0 15	A fairly good crop; free from rust, but flags blighted.
6	Thew wheat and black vetches.	4 4 0 18	A fair crop; free from rust.
7	Huguenot wheat and black vetches.	2 18 3 20	A fair crop; similar to No. 2 in appearance.
8	Algerian oats and black vetches.	4 12 1 6	A fair crop; similar to No. 3.
9	Black winter rye ..	6 15 2 4	Good; nice colour; foliage good.
10	Cape barley and black vetches.	2 18 3 20	Poor crop.
11	Thew wheat and gray field peas.	4 14 1 4	Nice crop; appearance good.
12	Huguenot wheat and gray field peas.	4 12 2 11	,, ,,
13	Algerian oats and gray field peas.	3 18 2 7	A fair bulk of feed, but a lot of decayed flags.
14	Black winter rye ...	4 10 1 11	Nice green feed.
15	Cape barley	2 17 0 24	A poor result.
16	Thew wheat and red clover.	1 11 3 26	Very poor; clover no good.
17	Huguenot wheat and red clover.	1 5 0 26	,, ,,
18	Algerian oats and red clover.	1 10 1 5	,, ,,
19	Black winter rye and red clover.	5 4 0 10	Good bulk of feed, but short; showing much superiority to other plots.
20	Cape barley and red clover.	1 18 1 14	Generally poor; clover no good.

The soil in which the crops were grown was very irregular in quality, many of the unprolific spots, so typical in the Big Scrub, existing. On the southerly side there is a stretch of soil which appears to be of low quality, thus accounting for the low yields in Plots 15, 16, 17, 18, and 20. It will be noticed that No. 19, black winter rye and red clover, had about the same average as the other plots, 4, 9, and 14, thus bearing out its reputation of being suitable for poor land. It can be safely assumed that black winter rye is one of the most suitable forms of forage for winter use, as it has the great advantage of withstanding grazing. Wheat, although generally a good yielder, requires to be cut, and if animals are allowed to graze on it the plants are pulled out by the roots.

An area of 11 acres of Thew wheat yielded 14 tons of hay.

AN ADDITIONAL SKIN-IRRITATING PLANT.

FOR previous references see the *Gazette* for July, 1912, page 604, and October, 1913, page 911.

A correspondent from the Dubbo district speaks of a bush which induces Eczema (Dermatitis is doubtless meant). He makes the following statement:—

> My brother gets affected every time he goes on the land where it grows. I want an antidote, because it is a serious loss to us that my brother is not able to work in it. It is growing on undulating clay wheat land, timbered with Box (*Eucalyptus*) and Budda (*Eremophila Mitchelli*), and the bush itself grows an average of 3 feet high. It is called Seven Year Bush by some people, as it dies out in about that time if the country is ringbarked.

This is a native Daisy bush, *Olearia decurrens* Benth., and, like *Olearia viscidula* Benth., noted in the references at the beginning of this statement, is more or less covered with a sticky substance, and probably this is the cause of the skin irritation.

In regard to a plant which occurs abundantly like this, it is not easy to suggest remedial measures, but obviously anyone working amongst it should have leather gauntlets, and should not allow the plant to touch the skin. The local medical man should be consulted in regard to remedial measures in case the skin becomes irritated, or, better still, as to precautions to take before such an accident happens. In previous articles of this series I have referred to remedial measures, and will content myself with pointing out that some people are far more liable to this skin irritation than others, and that it would appear that the same person may be affected during one season and may escape punishment in another, but I speak with personal experience, when I say that the actual suffering and distress caused by plant irritation may be so great as to necessitate the subject being treated with the utmost respect.—J. H. MAIDEN.

Official Milk and Butter Records.

M. A. O'CALLAGHAN.

In tables given below are further complete records of cows that have reached the standard prescribed for the past year by the United Pure-bred Cattle Breeders' Association. The standard for 1914 is as under :—

200 lb. butter	... ...	2 to 3 years.
250 ,,	... ...	3 to 4 ,,
300 ,,	... ...	over 4 years.

As this has been the first year of official testing, the average farmers had no opportunity to make special provisions therefor, and consequently the records have suffered, because we happened to strike a year that called for special provision in the way of food supply, more especially in the Richmond River and South Coast districts. The records have already taught some breeders the great value of the regular and proper feeding of dairy cows, and much good has been done even by this, because we can never hope to raise the standard of our dairy cows to what it should be until we get more regular and consistent feeding of the animals, both the young and the mature.

There was at one time an idea among dairy-farmers that a cow had to be hungry-looking in order to give a good record. This idea, no doubt, obtained its origin from the fact that the heaviest milkers were the cows that, under ordinary food conditions, showed the scantiest amount of flesh on their bones.

All recent information, however, tends to show that a cow does best when she is in good working condition, and hence it is never advisable to allow a dairy cow to become actually thin. If she is yielding heavily and decreasing noticeably in flesh, it is a sign that her daily food ration is not up to the standard required, and the farmer should take proper care to see that the cow is kept up to her proper working condition.

The drought which prevailed on the Richmond River affected all yields there, and probably this accounts for the, comparatively speaking, poor showing made by the herds published in this issue. Only one cow of these Richmond River herds now published has reached the 350 lb. butter mark. On the other hand, three Jersey cows from the herd of Mr. J. Davies, of Scone, have given over the 400 lb. butter, but these latter animals have been well fed and have had a very favourable season for that part of the State.

The Pure Breeders' Association has raised the standard for this year, and farmers, generally speaking, throughout the State will have to consider whether they will not have to aim at a cow of a higher standard in order to make ends meet, owing to the increased cost of labour, and hence the increased cost of living.

Illustrations are given herewith of two cows that have been officially tested, namely, Camellia II of Darbalara, and Madeira VIII, from the herd of Mr. C. R. G. McDonald, of Ingleburn. In addition, illustrations are given

of two Ayrshire cows bred at the Berry Stud Farm before the Ayrshire herd there was dispersed. The cow Mystery is by the bull Jamie's Heir, recently sold to Mr. Houghton, of Yanco, whereas the cow Primrose II is a half-sister to Jamie's Heir, the bull that has been doing duty at Wollongbar for some years, and later at Grafton. Both these Ayrshire cows were at the Hawkesbury Agricultural College when the photographs were taken.

The back view of the cow Primrose II, the photograph for which was taken about a week before her last calving, shows the udder formation and escutcheon of the beast very plainly. This cow gave 6,948 lb. milk, producing 343 lb. butter in a season, on ordinary grass feed.

Cows Tested under the United Dairy Cattle Breeders' Herd-testing Scheme for periods of 273 days.

RECORDS of Mr. Dixon Cooke's Guernsey Herd at Alstonville.

Name of Cow.	Age at beginning of test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of test. Milk.	Yield on last day of test. Butter.
	Years.		lb.	lb.	lb.	lb.
Pearl III	4 years 1 month	2 Nov., 1912..	4,614	236	7·00	·29
Gay Parisienne.. ..	2	30 Dec., ,, ..	4,114	202	14·00	·64
Bordeaux Lass II ...	11	2 Feb., 1913..	4,162	209	12·00	·60
Luxury	9	8 May ,,	5,543	281	11·50	·59

RECORDS of Mr. Dixon Cooke's Shorthorn Herd at Alstonville.

Name of Cow.	Age at beginning of test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of test. Milk.	Yield on last day of test. Butter.
	Years.		lb.	lb.	lb.	lb.
Kate	7	6 Nov., 1912 ..	5,285	238	8·00	·32
Lady	6	9 Oct., ,, ..	5,349	237	9·00	·47
Maud	3½	30 Jan., 1913 ..	3,817	209	4·50	·24
Fancy	4 years 7 m'ths	27 Feb., ,, ..	5,315	289	13·50	·76

RECORDS of Mr. James Rixon's Jersey Herd at Nashua.

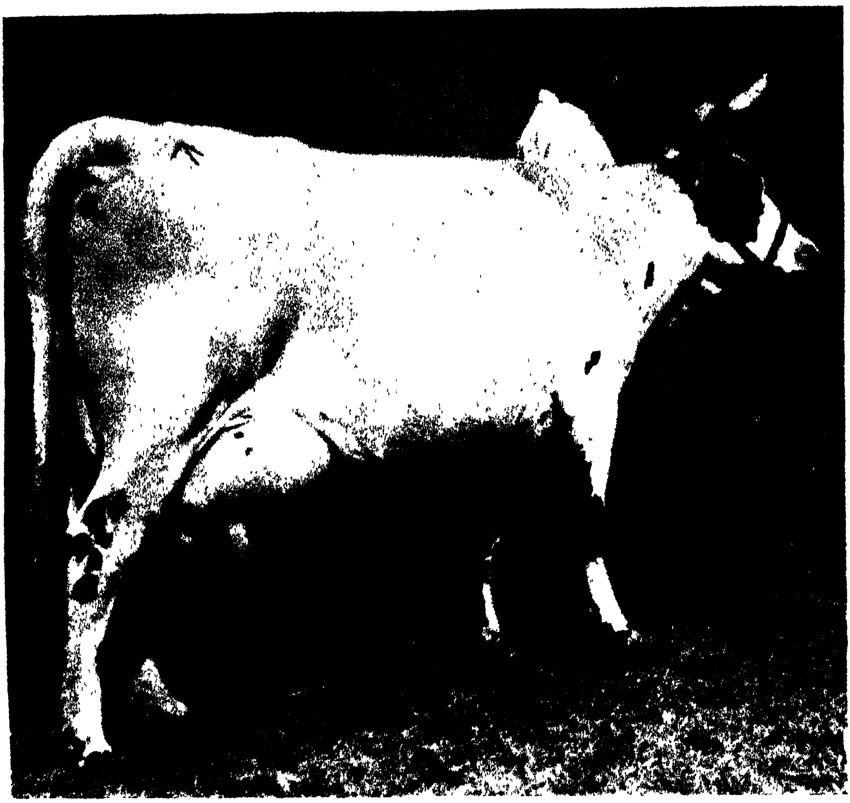
Name of Cow.	Age at beginning of test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of test. Milk.	Yield on last day of test. Butter.
	Years.		lb.	lb.	lb.	lb.
Emerald...	5	10 Oct., 1912...	5,890	329	11·75	·85
Evergreen	2¼	4 Nov., ,, ...	3,974	205	4·50	·28
Onex	6	7 Mar., 1913...	4,717	259	11·50	·62

Shorthorn Cow, Camellia 2nd, of Darbalara.

Produced [illegible] lb Butter in [illegible] days.

Jersey Cow, Madeira 8th.

Produced 482 lb Butter in 273 days.

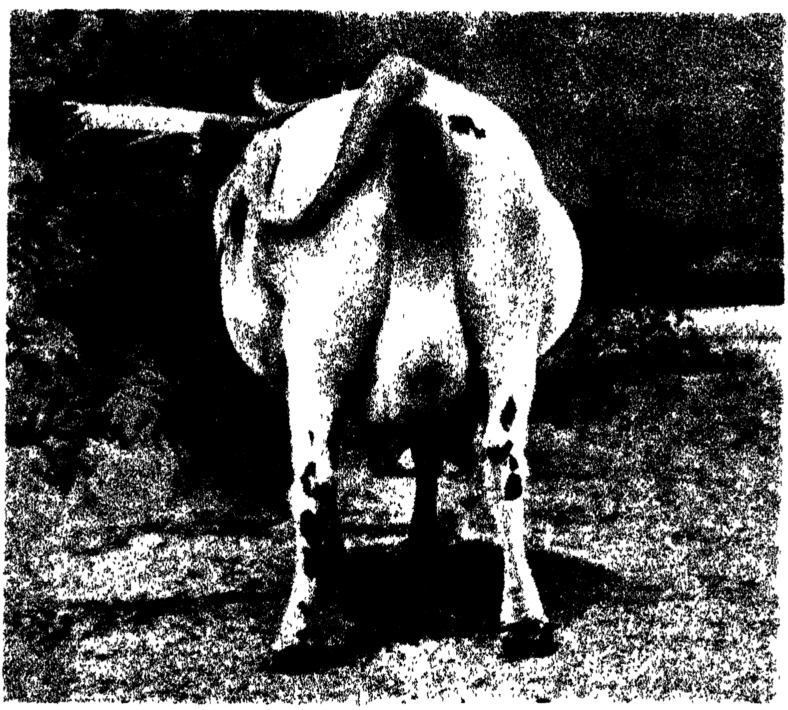


Ayrshire Cow, Primrose 2nd.

Bred at Berry Stud Farm

Ayrshire Cow, Mystery.

Bred at Berry Stud Farm.



Ayrshire Cow, Primrose 2nd.

Back view.

RECORDS of Mr. P. W. Tarlington's Jersey Herd at Uki.

Name of Cow.	Age at beginning of test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of test. Milk.	Yield on last day of test. Butter.
	Years.		lb.	lb.	lb.	lb.
Verna	6	25th Nov., 1912	4,383	226	6·00	·32
Zona	6	14th Oct., ,,	4,823	249	6·00	·40
Polly	6	21st ,, ,,	4,609	230	3·00	·20

RECORDS of Mr. F. G. Flower's Jersey Herd at Binna Burra.

Name of Cow.	Age at beginning of test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of test. Milk.	Yield on last day of test. Butter.
	Years.		lb.	lb.	lb.	lb.
Acrasia	6	18th Nov., 1912	6,045	401	7·50	·53
Model	5	1st Oct., ,,	4,397	271	2·00	·12
Stella	5	8th Nov., ,,	4,739	276	6·00	·44
Jersey Queen II ..	2	19th Jan., 1913	4,108	230	10·50	·64
Dabster	6	20th Feb., ,,	3,387	204	4·50	·26

RECORDS of Mr. Jack Davies' Jersey Herd at Scone.

Name of Cow.	Age at beginning of test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of test. Milk.	Yield on last day of test. Butter.
	Years.		lb.	lb.	lb.	lb.
Needle III	5	19th June, 1913	6,701	436	19·75	1·46
Marigold*	4½	3rd ,, ,,	6,286	410	18·75	1·16
Velvet III	4¾	14th ,, ,,	7,731	421	22·50	1·28

* This cow commenced the test in July, and slipped her calf on 15th December.

ALGAROBA OR MESQUITE BEAN.

GERMINATION OF SEEDS.

THE seeds of this fodder tree are very hard, and refuse to absorb water and germinate unless specially treated. The most effective treatment is to chip or scratch the seeds deeply with a hard knife. Soaking in hot water, as is often done for wattle seeds, is not very successful unless repeated several times. The seeds which swell should be removed each time and planted.

The tree thrives best in gullies or along creeks and in deep soils where the soil water is within 30 feet of the surface.—W. M. CARNE, Botanic Gardens.

An Enterprising Breeder of Guernseys.

Mr. E. P. Perry, of Parkville, Scone, has one of the few herds of pure-bred Guernseys in the State, and it is very interesting to find what can be done if only set about in the right way. During a course of dairying at the Wollongbar Experiment Farm, Mr. Perry became so convinced of the value of Guernsey cattle that he decided to aim at a stud of pure-breds on his farm at Parkville. With limited capital he started in a small but business-like way to build up a herd of this excellent dairy breed. With a few selected grade cows, three Guernsey heifers imported from the Island, and a bull imported from the stud of Mr. C. Hill, president of the American Guernsey Society in America, he made a beginning. Entering his pure-bred heifers for test under the United Pure-breeders' Scheme, together with several grade cows, the first nine months' test showed very good results, and the fact of his being able to show the official figures in connection with the testing of these few grade cows enabled him to dispose of nine of them (some of them nine years old), at the high price of £10 10s. per head, and the pick of two heifer calves from these cows which were all in calf to his imported bull. This sale encouraged and assisted him to proceed with the importation of more females, and he subsequently purchased five heifers from the Island, and these have recently arrived at their new home.

The following particulars will show their breeding. Two are by Lord Mar V, whose sire has been champion at the American National Show, and two others are daughter and grand-daughter respectively of the famous bull Governor of the Chêne, who has won several King's Cups on the Island, and has also sired two champion cows of the Island. It will, therefore, be seen that this last importation is of the highest quality. Good luck did not help Mr. Perry, for one of the three of his first lot of heifers died before completing a test, but the other two finished with 364 and 331 lb. butter respectively in the nine months' test. They are now on their second testing period, together with the newly imported heifers which are now calving.

Mr. H. Knodler, of Singleton, has also become alive to the possibilities of this breed, and has imported two heifers from the Island with, and from the same source as, Mr. Perry's cattle. He had previously purchased at a high figure a young bull out of La Colombe, one of Mr. Perry's first importations.

Mr. Perry's bull, Ajax of Sarnia, imported from America, is one of the finest Guernsey bulls we have in the State, and his breeding shows him to be, as his appearance suggests, a thorough dairy sire.

His sire, Selma's Glenwood, is out of one of the best known cows in America, Selma of Pinehurst, whose record stands at 13,383 lb. milk and 762 lb. butter fat in a year at 9 years of age. His dam, Mernal of Rosendale, died young, but her dam, Mernalette II has the following record—13,225 lb. milk and 664 lb. fat in twelve months.

This sort of enterprise is most commendable, and no doubt the success of these men will be the means of starting others out on similar lines, which means so much to the dairying industry.—F. Wigan, Dairy Instructor.

Egg-laying Tests at the Hawkesbury Agricultural College.

Twelfth Year's Results.

The twelfth year's series of egg-laying competitions conducted at the Hawkesbury Agricultural College concluded on Tuesday, the 31st of March.

The hens this year have not indulged in record-breaking, the results generally being somewhat below those of the previous series. This, however, is nothing more than the variations in production and value from year to year with which every commercial poultry farmer is familiar. It is evident from the continued rush of applicants for the pens available each year for the succeeding competitions that the active interest of the poultry community in this work is unabated. It is something indeed to record that it has not flagged after a dozen years' work, and this may safely be attributed to public confidence and the introduction each year of new educational experimental features.

On this occasion the innovation was the single pen system of testing individual hens, which was put into practice for the first time in poultry history in connection with competitive laying. There was an impression among breeders, to some extent backed by private experience, that a hen penned alone would not do herself full justice in production. Taking the year's experience as a whole, it can be said that this is a misapprehension. These hens did not put up anything more than ordinary records, but they finished the last three or four months in fine fettle; and had it not been that many of them fell into very low condition in October, for reasons which later experience shows can be guarded against, it is quite safe to conclude they would have done appreciably better. The test brought out many instructive features for those who were able to study the birds in conjunction with their individual records. For instance, one breeder's group included a hen which, though in apparently good health from start to finish, laid only twenty-three eggs, while another of the same group recorded 219. Another competitor penned six hens, whose laying ranged from 188 to 224, averaging 207, and five exceeding 200. It is notable, too, that one group of Black Orpingtons tested singly exceeded the collective total of any other pen of heavy breeds in the general section.

The test of judgment in selection, in which ten breeders supplied duplicate pens selected respectively as "good" and "bad" layers, gave much the same results as in the previous year, the average laying of the "good" pens

being fourteen eggs, and the value 1s. 8d. per hen, better than from the "bad" hens. The winner of this section was able to select hens that gave a return of £1 8s. 7d. more than his six "bad" hens!

Mr. D. S. Thompson, who has been in charge of the competitions since their inception, was transferred last January to take charge of the North Coast laying competitions at the Grafton Experiment Farm. So for the greater part of the heavy laying period this competition was still under his direction. Mr. A. L. Wyndham, having been transferred from the Wagga Experiment Farm, took up his duties on Mr. Thompson vacating the position. Mr. Wyndham is proving himself a painstaking officer, and competitors as well as the committee of management are looking to him to continue and consolidate the good work of these competitions. It is fully recognised that much of the success or otherwise hangs upon the management of the birds by the man on the spot, and that no matter how good the birds may be, the best can only be got from them by skilful attention.

The new features for the coming year include the testing of the intensive system. For this purpose an intensive house of ten sections has been erected, and ten breeders have entered duplicate pens, one of which will be penned in the open section and fed on the orthodox ration, including wet mash, while the counter pens will be kept continuously in the houses and fed according to the dry mash system. There is also another section, in which six pens, without any houses whatever, will be contrasted with duplicate pens from the same breeders in the thirteenth competition. Yet another experiment will be the testing of 100 White Leghorn pullets in an intensive house against 100 under semi-intensive conditions, both lots being fed on dry mash. These 200 pullets have been supplied by Mr. S. Ellis.

The executive management was in the hands of a committee consisting of Messrs. H. W. Potts (Principal, Hawkesbury Agricultural College), J. Hadlington (Government Poultry Expert), D. S. Thompson (succeeded by A. L. Wyndham), R. S. Cowan, S. Ellis, W. T. Ely, C. Leach, L. L. Ramsay, and A. A. Dunnicliff, junior (organising secretary).

THE PRIZE WINNERS.

Liberal cash prizes were given, amounting to £110, including £50 donated by *The Daily Telegraph*. The following were the winners in the various sections, the pens laying eggs weighing less than 24 oz. per dozen being ineligible for prizes:—

Third-year Hens.

Greatest number of eggs (proportion of laying) in the third twelve months:—M. A. White (1), £3; M. A. Vennard (2), £2; Miss A. Vaughan (3), £1.

Monthly prize of 10s. for the highest total from a pen:—April, Mrs. E. Scaysbrook, 39 eggs; May, Mrs. Scaysbrook, 45; June, Mrs. Scaysbrook, 44; July, R. Boardman, 74; August, M. A. Vennard, 113; September, Miss A. Vaughan, 111; October, Miss A. Vaughan, 126; November, M. A. Vennard, 114; December, Miss A. Vaughan, 115; January, Miss A. Vaughan, 109; February, M. A. White, 81; March, R. Boardman, 62.

Second-year Hens.

Greatest number of eggs in second twelve months:—S. Champion (1), £3; W. J. Ransley (2), £2; F. W. Rose (3), £1 10s.; H. J. F. Peters (4), £1; H. Hammill (5), 10s.

Greatest number of eggs in the two years:—S. Champion (1), £2 10s.; W. J. Ransley (2), £1 10s.; H. J. F. Peters (3), £1.

Winter test (April to July inclusive):—A. W. Waine, 246 eggs (1), £2; H. Ekin, 217 (2), £1; A. R. Kennedy, 202 (3), 10s.

Market value of eggs for two years:—S. Champion (1), £2; H. J. F. Peters (2), £1 10s.; W. J. Ransley (3), £1.

Monthly prize of 10s. for the highest total from a pen:—April, A. W. Waine, 65 eggs; May, A. W. Waine, 58; June, H. Ekin, 63; July, S. Champion, 125; August, W. J. Ransley, 137; September, J. Waugh, 130; October, W. J. Ransley, 134; November, W. J. Ransley, 134; December, H. Hammill, 138; January, A. Ringk, 130; February, H. Hammill, 116; March, S. Champion, 94.

Special trophy, value £5, for the pen laying the greatest number of eggs in the two years without the replacement of a bird:—S. Champion.

Twelfth Annual Competition.

Greatest number of eggs in the twelve months:—D. Salter (1), £5; J. D. Nicholson (2), £4; T. Partridge (3), £3; G. White (4), £2; E. T. Rhodes (5), £1 10s.; C. Leach (6), £1; E. W. Hyndman (7), £1; W. T. Ely (8), £1; C. W. Brown (9), £1; C. R. Hayes (10), £1.

Market value of eggs for twelve months:—D. Salter (1), £3 10s.; J. D. Nicholson (2), £2 10s.; C. Leach (3), £1 10s.; T. Partridge (4), £1.

Winter test (April to July inclusive):—D. Salter, 367 eggs (1), £3; C. Leach, 358 (2), £2 10s.; G. Judd, 339 (3), £2; E. T. Rhodes, 321 (4), £1; S. Ellis, 319 (5), 10s.

General utility prizes (open to pens, the hens in which average at least 6 lb. in weight at noon on 1st March, 1914), decided by the number of eggs laid:—P. C. McDonnell, average weight of hens 6 lb. 8 oz. (1), £3; O'Hearn Brothers, 6 lb. 3 oz. (2), £2; W. J. Buckland, 6 lb. (3), £1 10s.

Monthly prizes of 10s. for the highest total from a pen:—April, D. Salter, 58 eggs; May, C. Leach, 106; June, T. Pritchard, 128; July, M. A. Vennard, 128; August, A. R. Kennedy, 145; September, A. R. Kennedy, 142; October, T. Partridge, 152; November, T. Partridge, 147; December, T. Partridge, 147; January, T. Partridge, 141; February, G. White, 120; March, G. Speed, 97.

Test of Judgment in Selection.

Greatest difference in number of eggs laid in the two pens in the twelve months (subject to the pen selected as bad layers producing the smaller total):—J. Lowe (1), £2 10s.; T. Pritchard (2), £1 10s.; S. Ellis (3), £1.

Single Pen Test.

Light Breeds:—For the greatest number of eggs laid by a hen in the twelve months—W. T. Ely (1), £2; E. T. Rhodes (2), £1 10s.; F. J. B. Crowder (3), £1; C. R. Hayes (4), 10s.

Heavy Breeds:—For the greatest number of eggs laid by a hen in the twelve months—C. Leach (1), £2; C. Leach (2), £1 10s.; H. E. Upward (3), £1; P. C. McDonnell (4), 10s.

THE POULTRY EXPERT'S COMMENTS.

In a few general comments Mr. Hadlington observes:—

It was not expected by the committee of management after the experience of almost continuous showery weather for close upon two months in the winter, that any striking records would be put up in this competition. However, a satisfactory feature is that general averages of last year have been about maintained. Sufficient data having been obtained in connection with third-year laying, this section will now be discontinued. The inclusion of second and third year hens in these tests has provided poultry-keepers in general with reliable data of a most valuable nature, which has not previously been obtained under competitive conditions. This innovation has amply justified itself, and the Hawkesbury College laying competitions still lead the world in volume of reliable data of the most practical value to poultry-keepers.

Still more experimental work remains to be done; but if the best results are to be obtained, the co-operation of competitors in matters decided upon by the committee is essential to success. If these competitions are to fulfil their mission and not to become moribund, they should not be looked upon as purely an advertising medium for competitors, but as a means of demonstrating practical and profitable poultry-keeping under progressive conditions for the guidance of the industry. The committee of management has worked with a singleness of purpose to this end, and confidently looks for the whole-hearted co-operation of competitors to assist in furthering this objective.

Quality and Development.

Summarising the general quality and development of the birds penned in this competition, it must be admitted that there is room for much improvement. A large proportion of the competitors, it must be said, penned specimens worthy of their reputation and standing, and many birds in this competition would have, for standard quality, graced a show pen, and such have put up some of the highest records. It is regretted, however, that many pens failed to come up to the qualification of representative specimens of the breeds, both in quality, weight, and general development. This, it is felt, in no small measure has helped to pull down general averages in recent years, and also to militate against possible high records. It is felt that the time has arrived when quality and better development than in the past must be insisted upon as a qualification for entrance, if the splendid work of our competitions is to bear fruit commensurate with the already established records, and their educational features extended. I earnestly urge our utility breeders, in their own interests, to pay more attention to these features.

Selection of Layers.

If any justification were needed for the inauguration of the test of judgment in selection innovation, it can be found in the fact that no very con-

Mr. D. Salter's White Leghorns. Winners of Twelfth Annual Competition.

Mr. A. W. Waine's Black Orpingtons. Winners of Winter Test, First and Second years.

Mr. S. Champion's White Leghorns. Winners of the Two-years' Test.

EGG-LAYING TESTS AT THE HAWKESBURY AGRICULTURAL COLLEGE.

spicuous successes have been attained by entrants. True, some successes have been attained, but in nothing like the proportion that is considered possible. This is regarded as the best possible recommendation for the continuance of this class of test; the need for it is amply demonstrated. Looking over the pens in the light of experience, it is surprising that a better general conception of what constitutes a good or bad layer is not better demonstrated in some of the selections. It is feared that too much reliance is being placed upon "systems," or want of knowledge in their application is responsible for neglecting more ocular signs of the conformation of a good layer, and demonstrates the necessity for much educational work under this head. If this is the case in these test of judgment pens, it shows conclusively that higher general averages are possible with a better knowledge of selection.

SINGLE PEN RECORDS.

The single pen tests have failed to come up to expectations, both in regard to general averages and also the absence of any very high tallies. Various theories have been advanced to account for this. The one finding most favour is the isolation of the hens by themselves; but, as they are in sight of mates, only wire netting dividing them, I do not subscribe to that theory, and am rather of opinion that much has to be learned by those in charge in handling this section. Another factor is that no hens were allowed to be replaced in this test, and they suffered a greater mortality than any other section, principally during a severe heat wave. No attempt is made to explain this, but the fact is there. The continuance of this test is very necessary to bring out many features which the past year has left in doubt.

MORTALITY AND DISEASE.

The general health of the birds was good, and again there was no case of infectious disease. The death-rate, however, was fairly high, totalling 69 out of the 660 birds. This included 17 hens that succumbed to heat apoplexy on February 7. Eleven out of 60 single-pen hens died, 28 out of 360 first-year, 23 out of 180 second-year, and 7 out of 60 third-year.

THE FINANCIAL ASPECT.

The 660 hens of various ages showed a net profit over the cost of feed of 10s. 1d. each. The total net value of the hen eggs, after deducting freight and selling charges, was £520 11s., and the cost of feed £187 8s. 9d., leaving a surplus of £333 2s. 3d. The following are the details:—

THIRD-YEAR HENS.

Cost of feeding: Grain, £9 0s. 2d.; bran and pollard, £6 1s. 8d.; shell grit, 6s. 9d.; meat, £1 1s. 8d.; green feed, 15s.; total £17 5s. 3d., or 5s. 9d. per head.
Market value of eggs laid, £29 16s. 3d., leaving a profit of £12 11s.

SECOND-YEAR HENS.

Cost of feeding: Grain, £27 0s. 6d.; bran and pollard, £18 4s.; shell grit, £1; meat, £3 4s.; green feed, £2 5s.; total, £51 13s. 6d., or 5s. 9d. per head.
Market value of eggs laid, £119 12s., leaving a profit of £67 18s. 6d.

FIRST-YEAR HENS.

Cost of feeding (including 10 pens of "bad" layers and 10 groups in the single pen test): Grain, £63 5s.; bran and pollard, £40 1s. 8d.; meat, £7 11s. 8d.; shell grit, £2 6s. 8d.; green feed, £5 5s.; total, £118 10s.

Market value of eggs laid, £371 2s. 9d., leaving a profit of £252 12s. 9d.

THE MONTHLY LAYING.

The following is the total laying in the various sections each month:—

	Third-year Hens.	Second-year Hens.	First-year Hens.	"Good" Layers.	"Bad" Layers.	Single Pens.
No. of pens ...	10	30	*50	10	10	10
April	143	395	1,036	250	151	356
May	95	394	2,118	551	451	626
June	82	765	3,683	792	699	814
July	459	2,145	4,556	1,019	918	879
August	792	2,855	6,004	1,121	1,093	1,162
September	861	3,205	6.248	1,216	1,140	1,143
October	901	3,187	6,087	1,261	1,199	1,107
November	799	3,194	5,680	1,218	1,169	951
December	763	2,713	5,246	1,132	1,069	1,018
January	709	2,732	5,036	1,044	1,005	971
February	530	2,230	4,266	904	837	786
March	328	1,341	3,159	710	669	539
Totals... ..	6,462	26,156	53,119	11,218	10,400	10,352

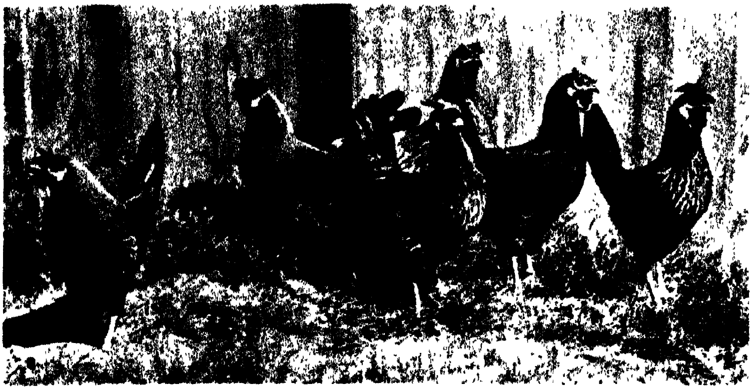
* Including 10 pens of "good" layers.

COMPARISON OF RESULTS.

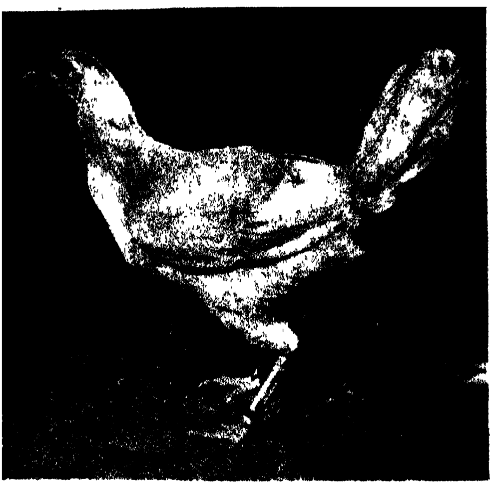
The following tables analyse and compare the results of the whole series:—

THIRD-YEAR HENS.

	First Competition.	Second Competition.	Third Competition.	Fourth Competition.
Number of pens...	10	10	10	10
Highest total, three years	3,063	3,293	3,282	3,059
,, ,, third year	823	1,013	910	808
,, ,, second year	1,008	1,045	1,110	1,028
,, ,, first year	1,333	1,341	1,321	1,345
Average per hen, first year	207·9	206·8	183·2	200·6
,, ,, second year... ...	156·2	148·7	146·9	141·1
,, ,, third year	115·3	130·1	109·2	116·5
Profit over feed per hen, first year ..	14/3½	18/6½	11/8½	14/6½
,, ,, ,, second year	11/-	6/8¾	8/6	7/7
,, ,, ,, third year ...	4/9	5/8	4/5	4/2
Greatest value of eggs, three years ...	£16/9/3	£16/18/8	£16/19/7	£15/9/6



Mr. W. J. Ransley's Brown Leghorns. Second in Second-year Test.



The Best Hen (Mr. W. T. Ely's) in the Single Pen Test, 245 Eggs.

This does not fairly indicate the true type of this bird as she proved a most refractory subject for the camera.

The Worst Layer in the Single Pen Test, 23 Eggs.

Mrs. E. J. Hunt's Langshans.

THIRD-YEAR HENS—*continued.*

	Eggs per Hen.			Value per Hen.		
	First Year.	Second Year	Third Year	First Year	Second Year.	Third Year.
6 R.C. White Leghorns	227	171	114	23/4	18/7	10/11
24 S.C. White Leghorns ..	207	152	134	21/4	15/1	10/10
18 Black Orpingtons ..	196	136	110	19/-	14/9	9/9½
6 Silver Wyandottes ..	188	112	106	18/11	11/4	9/-
6 Plymouth Rocks	178	111	67	18/5	13/-	6/7
Average cost of feed per head .				6/1½	7/1¾	5/9

SECOND-YEAR HENS

	First	Second.	Third	Fourth	Fifth	Sixth	Seventh
Number of pens	40	50	40	40	30	30	30
Highest total, two years..	2,487	2,634	2,319	2,369	2,372	2,373	2,552
,, ,, second year	1,054	1,150	1,013	1,045	1,110	1,028	1,091
Average per hen, first year	180	179	190	194	184	201	194
,, ,, second year	124	127	140	134	140	135	145
Profit over feed per hen, first year ...	11/2	10/11	11/4	16/9	10/2	14/4	14/-
Profit over feed per hen, second year	6/0½	5/4¼	9/8	5/8	8/3	6/11	7/6
Greatest value of eggs, two years	£12 1/6	£12/16/9	£13 2/5	£12/14/2	£12/2/2	£12/11/7	£13/12/3

	Eggs per Hen		Value per Hen	
	First Year	Second Year	First Year	Second Year
6 Brown Leghorns .	228·0	180·0	25/2	16/10
114 White Leghorns .	200·6	146·9	21/1	13/7
36 Black Orpingtons .	179·4	119·9	19/8	12/
12 Silver Wyandottes .	175·7	120·2	20/1	12/2
12 Langshans	173·9	131·1	19/3	13/3

TWELFTH ANNUAL COMPETITION.

	No. of Pens.	Winning Total.	Lowest Total	Highest Monthly Total	Average per Hen	Greatest Value	Average Net Price of Eggs.	Average Value per Hen.	Cost of Feed per Hen.	Profit over Feed.
1st ...	38	1,113	459	137	130	140/-	1/1	15/6	6/-	9/6
2nd ...	70	1,308	666	160	163	150/-	1/3¾	17/9	5/9¾	12/-
3rd .	100	1,224	532	154	152	114/-	1/-	12/9	4/5½	8/3
4th ...	100	1,411	635	168	166	125/-	-/11¼	13/3	5/3½	8/-
5th ...	100	1,481	721	162	171	137/-	1/0½	14/10	5/10	9/-
6th ...	60	1,474	665	161	173	149/-	1/2¼	17/2	7/-	10/2
7th ...	50	1,379	656	159	180	146/-	1/3¼	19/2	7/9½	11/4
8th ...	60	1,394	739	158	181	173/-	1/5¼	21/9	6/9	15/-
9th ...	40	1,321	658	151	168	134/5	1/2	16/3½	6/5½	10/2
10th ...	50	1,389	687	146	184	141/9	1/2¼	18/5½	6/1½	12/4
11th ...	50	1,461	603	156	178	164/7	1/3½	19/4½	7/3½	12/0¾
12th ...	50	1,360	724	152	177	145/3	1/2½	17/7	5/9	11/10

TWELFTH ANNUAL COMPETITION—*continued.*

	Eggs per Hen.	Value per Hen.
168 S.C. White Leghorns ..	187·4	18/9
24 Langshans	184·5	18/10
6 Brown Leghorns	175·6	16/7
12 R.C. White Leghorns ...	174·0	17/4
36 Black Orpingtons	168·1	17/1
6 Minorcas	150·1	14/-
42 Silver Wyandottes	135·3	15/1
6 White Wyandottes ...	120·6	12/-

TEST OF JUDGMENT IN SELECTION.

	"Good" Layers.		"Bad" Layers.		Points.
	Eggs.	Value.	Eggs.	Value.	
		£ s. d.		£ s. d.	
J. Lowe	1,129	5 15 7	911	4 7 0	218
T. Pritchard	1,096	5 13 3	900	4 13 5	196
Mrs. E. J. Hunt	1,198	5 16 8	1,041	5 5 6	157
A. C. Collis	910	4 7 5	751	3 8 4	159
E. J. Goddard	1,127	5 14 1	1,030	5 1 9	97
S. Ellis	1,169	6 3 2	1,093	5 13 4	76
T. Partridge	1,290	6 10 6	1,232	5 15 7	58
Miss Hodkin	1,031	5 3 1	1,056	5 2 0	— 25
W. J. Wexted	1,167	5 18 3	1,213	6 7 2	— 46
King and Watson	1,101	5 8 6	1,173	5 15 6	— 72

	"Good" Layers.	"Bad" Layers.
Number of pens	10	10
Total eggs laid	11,218	10,400
Average per hen	187	173
Total value	£56/10/-	£51/9/7
Value per hen	18/10	17/2
Profit over feed per hen ..	13/1	11/5

THE DETAILED RETURNS.

The tables on the following pages give full details of the number of eggs laid by each pen of six birds (or each bird in the single pen test), together with the market value and the average weight of the eggs. The figures in parentheses after each competitor's name indicate the deaths during the whole period of the section. In the twelfth annual competition the pens with an asterisk (*) preceding the owners' name were selected as bad layers, and (s) indicates the groups of hens tested in single pens.

Third-year Hens

Owner and Breed.	First Year.	Second Year.	April	May.	June.	July	August.	Sept.	October.	Nov.	Dec.	Jan.	Feb.	March.	Third Year	Grand Total.	Proportion Third Year.	Weight per doz.	Value Third Year	Total Value.
																		oz.		
1. M. A. Vennard (1), Eastwood. White Leghorns	1272	944	12	-	1	66	118	105	102	114	95	105	64	31	808	3024	134	25	71/9	298/5
2 Miss A Vaughan (0), Crabble's Creek White Leghorns.	1216	871		—	12	60	76	111	126	100	115	100	72	10	801	2888	133	25	68 9	273 0
3 Mrs. E Scaysbrook (1), East Gosford Black Orpingtons	1178	1013	39	15	11	48	75	76	102	92	76	68	67	56	788	2979	131	26	82 6	309,6
4. M. A. White (2), Wilberforce: White Leghorns.	1190	995	4	-		58	85	91	98	96	88	102	81	29	738	2923	115	27	66/1	297/5
5. R. Boardman (1), Camden: R.C White Leghorns.	1345	1028	10	—	7	74	78	84	76	71	73	79	72	62	686	3059	114	25	65/6	317/1
6 S Ellis (2), Botany: White Leghorns	1292	838	6	—		62	89	90	96	82	72	79	45	2	631	2761	125	26	54/-	272 5
7 W H Forsyth (1), Willoughby. Silver Wyandottes	1131	672		9	1	27	97	108	90	71	60	42	57	43	614	2417	106	25	51/4	235 9
8. H. J. Hollier (3). Ema Plains: Black Orpingtons.	1149	769	29	29		14	57	70	64	61	70	54	28	36	512	2430	110	25	50/2	249/2
9. A. Hollings (1), Granville: Black Orpingtons.	1196	667	6	3	1	38	50	52	81	60	60	39	29	37	486	2349	90	26	43 9	241 0
10 R. H Stewart (4), Yanco. Plymouth Rocks	1070	670	37	9	15	12	39	62	58	43	54	32	15	22	398	2138	67*	24	39/4	227 8

* The prizes for the third year were awarded on the proportion of laying, which was arrived at by taking the average production of the hens remaining in the pen, those dying during this year not being replaced.

The following lost birds by death during third year:—M. A. White (1), Ellis (1), Forsyth (1), Hollier (3), Hollings (1), Stewart (1)

C

Second-Year Hens.

Owner and Breed.	First Year.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	January.	Feb.	March.	Second Year.	Grand Total.	Weight per doz.	Value Second Year.	Total Value.
																oz.		
1. S. Champion (0), Eskbank : White Leghorns ..	1461	6	3	60	125	107	127	110	121	103	128	107	94	1091	2552	24	107/8	272/3
2. W. J. Ransley (1), Llandilo : Brown Leghorns ..	1368	10	—	29	119	137	129	134	134	131	82	113	62	1080	2448	24	101/-	252/2
3. H. J. F. Peters (0), Pennant Hills : White Leghorns..	1381	7	13	49	76	118	129	126	133	84	121	110	58	1024	2405	24	93/1	252/3
4. F. W. Rose (0), Bankstown : White Leghorns ..	1225	19	1	27	99	120	119	122	133	99	122	99	69	1029	2254	24½	97/8	232/1
5. H. Hammill (1), Kogarah : White Leghorns ..	1250	—	13	25	84	107	100	118	116	138	122	116	56	995	2245	24	94/-	226/-
6. A. Ringk (0), Ryde : White Leghorns ..	1273	—	2	49	89	97	115	117	116	104	130	75	54	948	2221	24½	89/2	232/2
7. Hillcrest Farm (2), Berowra : White Leghorns	1254	7	1	34	84	92	120	124	116	108	101	77	61	925	2179	25	86/6	222/6
8. W. J. Tipper (0), Belmore : White Leghorns ..	1119	10	—	44	82	96	118	119	121	123	112	100	58	983	2102	25½	98/2	213/5
9. J. Heavey (3), Penrith : White Leghorns ..	1184	3	2	17	74	110	103	128	123	115	104	99	22	900	2084	25	81/-	209/8
10. J. Waugh (0), Bankstown : White Leghorns ..	1142	25	9	2	86	72	130	127	125	129	110	88	36	939	2081	25½	86/4	208/9
11. W. Smith (3), Rydalmere : Black Orpingtons ..	1203	13	8	8	52	102	119	100	96	104	89	56	90	837	2040	24	78/7	209/-
12. A. W. Waine (0), Mt. Drummond : Black Orpingtons	1232	65	58	51	72	95	83	75	72	62	54	39	60	786	2018	24½	87/9	231/-
13. C. Bloomfield (1), Willoughby : White Leghorns ..	1287	2	—	—	54	97	112	123	100	79	83	60	18	728	2015	24	62/2	207/9
14. R. Farlow (1), Freeman's Reach : White Leghorns ..	1178	2	—	5	68	98	108	125	123	98	78	77	48	830	2008	26½	74/2	204/5
15. E. H. Shipp (0), Helensburgh : White Leghorns ..	1176	—	—	9	78	115	114	120	122	98	91	77	8	832	2008	25	72/3	196/9
16. W. Thiele (0), Kenthurst : White Leghorns ..	1149	2	47	38	85	116	114	81	107	83	66	73	37	849	1998	24½	83/9	211/1
17. Gordon Bros. (1), Dundas : White Leghorns ..	1207	13	21	16	54	78	104	102	102	70	110	89	26	785	1992	25½	74/2	206/6
18. Miss A. Kable (4), Tamworth : White Leghorns ..	1129	—	1	9	96	104	109	123	126	103	103	57	7	838	1967	25½	72/7	191/1
19. H. Ekin (1), Kogarah : Langshans ..	1115	33	44	63	77	83	94	91	98	58	81	66	47	835	1950	25	87/7	214/2
20. G. Hopping (2), Ingleburn : White Leghorns ..	1139	—	2	20	47	102	117	122	127	87	97	52	27	800	1939	25	70/-	192/7
21. Mrs. S. R. Davis (0), Turramurra : White Leghorns	1076	5	2	15	90	91	121	160	110	102	86	89	36	847	1923	24	78/-	190/-
22. A. D. Knox (1), West Wallsend : Black Orpingtons	1090	—	—	—	54	96	100	98	124	102	114	40	63	811	1901	24½	70/4	192/-
23. C. C. Kennett (2), Glenfield : White Leghorns ..	1104	5	6	27	90	92	88	91	84	54	91	75	38	741	1845	24½	70/8	193/5
24. Mrs. J. H. Jobling (1), Plattsburg : Black Orpingtons	1105	42	35	24	7	62	96	98	85	79	93	49	65	735	1840	26½	74/5	192/2
25. R. Jobling (3), Wallsend : Silver Wyandottes.. ..	1073	29	35	30	27	43	86	114	93	70	92	61	81	761	1834	25	75/9	201/9
26. D. Kenway (4), W. Pennant Hills : Black Orpingtons	1120	59	42	28	73	88	84	70	82	62	51	53	9	701	1821	24	73/2	199/4
27. W. G. Smith (2), Carlingford : White Leghorns ..	1141	—	—	13	68	109	101	98	84	63	55	65	15	671	1812	25½	59/3	85/5
28. F. Styles (1), Hill Top : Langshans ..	972	22	20	21	31	82	105	89	93	91	73	96	28	751	1722	24½	72/2	177/2
29. R. S. Youl (0), Turramurra : Silver Wyandottes ..	1036	15	29	38	41	92	92	82	69	66	66	52	40	682	1718	25½	67/6	186/-
30. L. L. Ramsay (2), Carlingford : Black Orpingtons ..	709	1	—	14	63	54	68	60	59	48	27	20	28	442	1151	25	50/1	119/9

TWELFTH ANNUAL COMPETITION.

Owner and Breed.	April.	May.	June.	July.	August	Sept.	October.	Nov.	Dec.	January.	Feb.	March.	Total.	Weight per doz.	Market Value.
														oz.	
1. D. Salter (0), Wilberforce : White Leghorns	58	75	111	123	139	137	135	131	127	129	108	87	1360	26	145/3
2. J. D. Nicholson (0), Arncliffe : White Leghorns	21	92	75	118	142	137	148	142	117	123	119	93	1327	25	138/2
3. T. Partridge (2), Westmead : White Leghorns	7	53	122	133	109	141	152	147	147	142	106	52	1290	28	130/6
* T. Partridge (1), Westmead : White Leghorns	40	52	59	105	121	131	145	137	136	106	101	99	1232	23	115/7
4. G. White (0), Willoughby : White Leghorns	23	65	72	111	132	134	141	130	109	137	120	91	1265	26½	130/3
5. (s). E. T. Rhodes (0), Ryde : White Leghorns	42	78	101	100	122	135	143	117	134	129	99	38	1241	26	129/2
6. (s). C. Leach (2), Belmore : Black Orpingtons	43	106	116	93	120	128	129	118	118	107	97	56	1231	24	133/3
7. E. W. Hyndman (0), Miranda : White Leghorns	3	39	77	103	139	124	146	136	137	130	117	67	1218	24	119/3
8. Mrs. E. J. Hunt (0), Berowra : Langshans	58	68	91	112	126	123	119	128	108	89	79	97	1198	23	116/8
* Mrs. E. J. Hunt (0), Berowra : Langshans	38	72	91	80	93	104	97	117	92	85	79	93	1041	23	105/6
9. (s). W. T. Ely (0), Harris Park : White Leghorns	35	61	72	108	116	129	128	93	137	120	113	74	1186	26	119/7
10. C. W. Brown (1), Linden : White Leghorns	21	72	164	97	121	128	146	120	90	123	101	60	1183	24	129/5
11. (s). C. R. Hayes (0), Blacktown : White Leghorns	23	12	63	116	128	130	135	117	128	137	106	83	1178	25	115/6
12. G. Speed (0), Mount Druitt : White Leghorns	4	34	44	105	116	136	139	129	128	131	114	97	1177	25½	114/9
13. S. Ellis (0), Botany : White Leghorns	26	78	92	123	124	117	134	116	103	99	91	66	1169	26	123/2
* S. Ellis (0), Botany : White Leghorns	13	83	58	108	106	113	130	119	99	103	101	60	1093	25	113/4
14. W. J. Wexted (0), Rozelle : White Leghorns	22	79	55	102	103	133	145	130	128	122	94	54	1167	26	118/3
* W. J. Wexted (2), Rozelle : White Leghorns	22	90	92	91	126	134	122	123	136	117	95	65	1213	25	127/2
15. M. A. White (1), Wilberforce : White Leghorns	13	69	86	91	117	134	140	126	125	116	78	56	1151	24	116/9
16. G. Judd (1), Boolaroo : Langshans	36	83	114	106	120	127	98	120	108	96	72	68	1138	24½	123/3
17. Johns Bros. (0), Wyong : White Leghorns	9	53	108	40	136	129	137	129	135	111	94	54	1135	24½	114/1
18. M. A. Vennard (1), Eastwood : White Leghorns	22	19	66	128	141	127	120	116	113	136	103	44	1135	27	121/6
19. J. Lowe (0), Baulkham Hills : White Leghorns	40	87	40	98	92	131	130	126	136	120	87	42	1129	25	115/7
* J. Lowe (0), Baulkham Hills : White Leghorns	–	43	29	73	104	110	128	115	95	95	78	39	911	24½	87/-
20. A. W. R. Simpson (1), Belmore : White Leghorns	20	34	63	93	129	112	130	122	128	132	108	58	1129	25	112/-
21. E. J. Goddard (0), Mascot : Langshans	45	84	98	106	111	103	108	124	95	94	87	72	1127	23½	114/1
* E. J. Goddard (2), Mascot : Langshans	—	24	100	119	119	127	118	118	105	89	63	48	1030	24	101/9
22. J. Silcock (0), Rhondda : White Leghorns	17	20	71	97	132	140	135	138	136	124	74	43	1127	26	107/9
23. A. Duffield (0), Carlingford : White Leghorns	20	36	40	97	95	138	144	140	132	116	106	56	1120	25½	110/2
24. Cowan Bros. (0), Burwood : White Leghorns	27	18	81	92	133	130	117	126	101	90	110	84	1109	24½	112/2
25. (s). F. J. Brierley (0), Cheltenham : White Leghorns	55	65	62	78	125	120	133	93	117	106	87	63	1104	24	114/6
26. King and Watson (0), St. Marys : White Leghorns	14	24	51	90	122	131	139	124	114	120	94	78	1101	28	108/-
* King and Watson (2), St. Marys : White Leghorns	11	24	67	106	129	124	130	137	130	136	99	80	1173	28	115/6
27. A. R. Kennedy (0), Carlingford : Black Orpingtons	31	71	99	108	145	142	113	87	88	71	66	77	1098	26	117/9
28. Kaiser Bros. (0), Sackville : White Leghorns	3	22	63	101	138	139	117	112	117	122	100	63	1097	23	98/6
29. T. Pritchard (2), Ingleburn : Black Orpingtons	—	36	128	95	140	113	111	113	110	86	91	73	1096	24	118/3
* T. Pritchard (0), Ingleburn : Black Orpingtons	21	37	82	66	90	100	98	100	83	92	65	66	900	24	93/5
30. E. T. Griffiths (1), Waratah : White Leghorns	26	49	110	65	127	131	131	96	108	107	77	62	1089	25	112/4
31. Mrs. Cunningham (1), Belmore : White Leghorns	38	56	85	85	129	115	135	118	96	97	77	84	1079	24½	108/7
32. R. J. Metherell (1), Lower Portland : Silver Wyandottes	—	42	130	105	131	130	116	99	81	76	77	83	1070	23½	104/8
33. W. H. Forsyth (1), Willoughby : Silver Wyandottes	50	35	42	96	132	126	100	114	89	102	82	96	1067	27	110/-

TWELFTH ANNUAL COMPETITION—*continued.*

Owner and Breed.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	January.	Feb.	March.	Total.	Weight per doz.	Market Value.
														oz.	
34. P. Paulsen (0), Boolaroo : Brown Leghorns	5	—	49	95	132	129	136	123	123	109	95	58	1054	25	99/7
35. R. Boardman (0), Camden : R.C. White Leghorns	13	34	80	86	112	128	124	109	82	97	97	86	1048	27	107/9
36. Lucknow Farm (1), Ryde : White Leghorns	30	53	58	86	107	119	119	121	110	111	89	44	1047	24½	106/9
37. J. Ireland (0), Helensburgh : R.C. White Leghorns	3	19	50	101	118	127	128	125	102	108	96	64	1041	24	100/3
38. Miss Hodkin (0), Minto : White Leghorns	26	30	44	84	90	119	131	121	120	86	91	89	1031	25	103/1
* Miss Hodkin (0), Minto : White Leghorns	4	14	74	72	95	112	131	140	133	130	94	57	1056	26	102/-
39. A. Windeyer (0), Beecroft : White Leghorns	4	32	97	96	117	122	100	79	99	99	103	53	1001	25	102/6
40. H. J. Hollier (0), Emu Plains : Black Orpingtons	24	52	102	111	141	121	125	99	64	63	53	41	996	24½	103/1
41. (s). P. C. McDonnell (2), Beecroft : Black Orpingtons	38	89	108	64	128	128	99	77	70	76	53	55	985	24	97/9
42. R. E. Howcroft (0), Miranda : White Leghorns	2	21	74	72	125	133	102	117	110	90	93	46	985	25	95/9
43. S. Best (0), West Kogarah : White Leghorns	15	1	51	89	120	140	134	116	111	103	64	30	974	26	90/9
44. S. A. Bartlett (2), Quirindi : Langshans	25	3	72	88	116	110	101	94	84	99	92	81	965	24	97/7
45. Burrows and Lovegrove (0), Rooty Hill : Black Orpingtons	56	84	53	95	110	123	112	81	72	73	45	57	960	23½	95/6
46. D. Morris (0), Kellyville : White Leghorns	8	21	43	60	114	132	146	111	137	99	60	29	960	23	83/1
47. Mrs. E. Scaysbrook (1), E. Gosford : Black Orpingtons	-	53	61	53	116	143	123	109	88	71	68	68	958	21½	88/-
48. A. Hollings (1), Granville : Black Orpingtons	45	34	85	74	132	107	96	99	81	95	52	50	950	26	98/3
49. G. Marshall (0), Carlingford : White Leghorns	3	20	68	62	134	127	129	103	91	102	78	15	932	23	87/-
50. A. C. Collis (1), Rookwood : Silver Wyandottes	12	12	71	96	104	99	92	89	71	87	84	93	910	23	87/5
* A. C. Collis (1), Rookwood : Silver Wyandottes	—	12	47	98	110	85	100	63	60	52	62	62	751	23	68/4
51. F. A. Hollier (0), Emu Plains : Minorcas	11	29	30	40	101	141	123	122	117	82	65	10	901	28	84/4
52. A. F. Hayling (1), Walcha : Silver Wyandottes	—	18	62	101	104	132	102	73	75	88	78	64	897	24½	88/9
53. A. G. Davis (0), Bowral : Silver Wyandottes	24	41	100	79	101	101	74	91	77	66	63	70	887	24	96/4
54. (s). O'Hearn Bros. (3), West Maitland : Langshans	43	52	84	113	117	82	71	67	78	69	57	50	883	26	97/5
55. (s). H. E. Upward (2), Wyong : Silver Wyandottes	14	43	80	68	96	115	89	102	61	82	54	53	857	24	88/2
56. (s). G. Howell (1), Wentworthville : Silver Wyandottes	25	38	83	72	104	85	84	87	85	77	62	50	852	24	89/9
57. (s). F. J. B. Crowder (1), Canley Vale : White Leghorns	38	82	45	67	106	85	96	80	90	68	53	17	835	25	87/2
58. W. J. Buckland (0), Young : Silver Wyandottes	-	—	22	63	104	109	94	100	78	68	76	77	791	24½	74/4
59. J. Brann (0), Albury : Silver Wyandottes	8	12	35	80	86	90	87	97	84	68	61	52	760	24	73/7
60. G. N. Mann (2), Hoxton Park : White Wyandottes	38	53	58	45	99	88	83	62	64	42	31	61	724	21	72/2

Single Pen Test.

—	April	May.	June.	July.	August	September.	October.	November.	December	January.	February.	March.	Total.	Weight per doz. (oz.)
E. T. Rhodes ..	4	20	20	16	22	24	23	18	21	22	14	1	205	26
E. T. Rhodes .	11	15	17	14	15	24	22	17	22	20	20	8	205	27½
E. T. Rhodes ..	9	20	19	10	21	21	26	21	24	21	10	—	202	24
E. T. Rhodes .	12	5	21	22	23	23	23	19	23	20	19	14	224	24½
E. T Rhodes .	6	18	9	16	19	22	23	20	20	20	12	3	188	26½
E. T. Rhodes .	--	—	15	22	22	24	26	22	24	26	24	12	217	24
C. Leach	10	19	20	17	24	20	23	16	15	12	19	19	214	24½
C. Leach	—	15	22	16	19	26	18	21	19	19	*4	*	179	23½
C. Leach .	10	15	18	18	21	17	23	20	23	14	18	14	211	24½
C. Leach . ..	18	24	19	10	24	23	25	24	22	22	21	*7	239	22
C. Leach .	5	22	14	14	17	19	18	14	14	17	17	9	180	22
C. Leach		11	23	18	15	23	22	23	25	23	18	7	208	22
W. T. Ely	11	25	18	22	14	24	23	22	23	24	20	19	245	25
W T. Ely ..	15	8	7	17	20	22	22	10	22	21	24	21	209	24½
W T. Ely	5	—	2	16	21	20	23	14	24	18	19	13	175	27½
W. T. Ely	4	12	14	14	20	19	19	16	22	11	8	5	164	26
W T. Ely	--	13	21	20	21	23	21	14	22	24	21	8	208	25½
W. T. Ely	—	3	10	19	20	21	20	17	24	22	21	8	185	22
C. R. Hayes .	—	—	2	20	23	22	20	22	21	23	17	8	178	23
C. R. Hayes	3	-	2	24	22	23	25	18	27	16	14	14	188	23½
C. R. Hayes .		1	21	19	23	22	25	23	21	21	17	10	203	25½
C. R. Hayes	12	11	19	17	19	21	19	18	18	24	21	19	218	26
C. R. Hayes ..		-	3	13	19	19	23	17	15	25	14	12	160	25
C. R Hayes .	8	—	16	23	22	23	23	19	26	28	23	20	231	23½
F. J. Brierley	8	12	13	15	20	24	22	15	13	3	—	4	149	22
F. J. Brierley .	19	19	13	15	22	22	23	18	13	18	16	13	211	22½
F. J. Brierley .	6		3	16	18	17	20	14	24	22	18	11	169	24½
F J. Brierley	1	14	14	10	22	20	21	17	25	16	15	-	178	24
F J. Brierley	6	8	6	12	22	19	23	16	18	25	16	21	192	22½
F. J. Brierley	12	12	13	10	21	18	24	13	24	22	22	14	205	25¼
P C. McDonnell	12	3	16	5	22	13	24	18	15	11	12	17	168	26½
P C. McDonnell	—	18	22	15	18	26	15	22	11	22	18	9	196	24½
P. C. McDonnell	11	14	21	11	24	26	25	22	16	18	12	16	216	22½
P. C McDonnell	3	20	17	11	19	23	*5	*	*	*	*	*	98	24½
P. C. McDonnell	12	22	11	10	24	20	23	10	19	15	*4	*	170	25
P. C. McDonnell	—	12	21	12	21	20	7	5	9	10	7	13	137	25½
O'Hearn Bros.	16	18	22	19	22	14	13	21	11	23	8	17	204	23
O'Hearn Bros.	10		10	24	22	10	1	9	3	0	16	18	123	26
O'Hearn Bros.		3	12	15	24	20	24	16	22	21	*5	*	162	25½
O'Hearn Bros.	10	16	14	12	3			1	6	1	*	*	63	25
O'Hearn Bros	7	15	14	20	22	22	10	5	20	8	22	15	180	25½
O'Hearn Bros.	—	—	12	23	24	16	23	15	16	16	*6	*	151	23½
G. Howell .	--		11	12	16	14	11	19	17	13	12	6	131	25½
G. Howell	8	17	15	12	19	14	17	14	14	12	10	18	165	24
G. Howell ..	—	—	3	9	17	12	10	9	8	7	5	2	82	22
G. Howell ..	-	4	18	13	16	15	17	18	12	10	14	11	148	21
G. Howell .	—		17	9	20	17	14	12	18	18	14	13	152	21½
G. Howell ..	22	17	19	17	16	13	15	15	16	17	*7	*	174	22½
H. E. Upward		21	10		8	14	16	17	6	11	13	8	124	19½
H. E. Upward .	-	-	17	1	16	15	12	15	15	16	8	13	128	22
H. E. Upward .	14		16	21	25	27	17	17	14	8	*	*	153	21
H. E. Upward ..	-	-	17	14	13	19	23	16	6	13	14	16	151	24
H E. Upward .			8	15	13	20	1	18	3	16	*	*	94	19½
H. E. Upward .	--	22	18	17	21	20	20	19	17	18	19	16	207	25
F. J. B. Crowder .	8	10	11	14	17	12	23	15	18	7	14	8	157	24½
F. J. B Crowder ..	11	13	11	19	24	25	25	22	27	23	18	1	219	25
F. J. B. Crowder ..	4	8	—	2	5	2		1	—	-	—	1	23	22½
F. J. B. Crowder ..	5	17	2	5	14	22	25	21	23	23	18	-	175	26½
F. J. B. Crowder .	4	18	3	16	24	*3	*	*	*	*	*	*	68	23½
F J. B. Crowder .	6	16	18	11	22	24	23	21	22	15	8	7	193	24½

* Dead.

POULTRY FARMING ON SMALL AREAS.

THE question of making a living from poultry on areas of about an acre is being seriously considered by a large number of people, judging from inquiries received by the Department. The following reply by the Poultry Expert to a correspondent who contemplated starting in the Hornsby District, will prove of interest in this connection:—

"As a poultry farming district, Hornsby is suitable; but if the intention is to make a living from fowls, it can be said without hesitation that the area mentioned (1½ acres) is not sufficient. The smallest area that could be recommended is 5 acres. It would be possible to work up a stock of a few hundred head on the smaller block mentioned, but it is not likely that anyone could succeed in maintaining that number and at the same time rear the required pullets for replacing the hens who have exhausted their period of profit as layers. This usually happens when the hens are two years old. It is to be pointed out that, according to plan submitted by the correspondent, after allotting the space required for the house and patch of green stuff, only about 1 acre would be available for the poultry yards.

"It is considered that no intensive system would provide a living from the 1½ acres under notice, and the area is not sufficient to carry more than 500 laying hens on any semi-intensive system that could be recommended. The point to be emphasised is, that if it is intended to keep 500 layers, it would be necessary, during some time of the year (presuming that the birds are to be bred on the farm), to have somewhere in the vicinity of 1,000 fowls, including the mature birds and the rising generation. In a flock of 500 layers, it is found the best practice to have, say, half first-year pullets and the balance second-year hens, so that it is only necessary to replace half the number (the second-year hens) each year. As the poultry farmer has to raise 250 pullets each year, and have them ready to replace the similar number of old hens which are culled, he would have to hatch about 620 chickens, half of which, on the average, would be cockerels. The matter might more clearly be shown thus:—

Chickens hatched	620
Proportion of cockerels	310
Gross number of pullets	310
Allowance for mortality (20 per cent.)	62
Balance, raised to laying age	248

No allowance has been made in these figures for any epidemic which, before being checked, might carry off numbers of fowls.

"Before deciding on any system of intensive or semi intensive yarding, it would be well to inspect both types. These can be seen at the Hawkesbury Agricultural College at Richmond, where intensive and semi-intensive buildings have been erected, and the birds will be put into them on the 1st of April. So far as capital expenditure is concerned, it will be found that either of these systems is more expensive than open runs.

"The semi-intensive system does not injure the stamina of the birds; on the contrary it develops it (and this is one of the points in favour of the system), as the hens have scratching exercise besides open range. Moreover, they can be confined in unfavourable weather, and at the will of the attendant. Of course, the semi-intensive is more expensive than the open range system, on account of the additional housing accommodation and the cost of litter."

How to start a Poultry Farm.

JAMES HADLINGTON.

POULTRY-KEEPING has fortunately passed the stage when one was continually met with the question, "Will poultry pay?" This has been amply demonstrated by the many who have succeeded in making it pay, and whose very existence in the business extending over many years is standing proof of that fact. But the evergreen subject still is, how can one with little or no experience start and make it profitable? Many people with a small amount of capital, who are anxious to get on the land, are turning their attention to poultry-keeping as an available means to that end. A small area of land, a little capital—with a good stock of commonsense and plenty of grit—are the first essentials. Next to these is a definite system and plan of operation, based upon methods that have been found successful. In other words, beginners are advised rather to follow proven practical methods, than to go in for experimenting, and what generally comes under the category of "ideas of their own." By all means let us have progressive methods, for which there is plenty of room, but these ideas of one's own, not based upon experience, are often fatal to success. The greatest failures the writer has seen have been made in this way. Ideas conceived in faddism, pursued in blissful ignorance, generally end in dismal failure. Such, then, should act as a warning to the inexperienced when starting poultry-farming with the idea of making a living.

On what scale should one start?

Naturally, many who essay to go into poultry-keeping, start out with the idea of buying up hundreds of laying pullets. This plan seems feasible when the price of pullets is based upon market rates for poultry; but unfortunately, when the would-be poultry fa mer sets out to purchase these pullets, he finds himself up against a much larger problem than had been anticipated, and instead of being able to purchase at these rates, he finds it very hard to purchase a good class of pullet at prices that would leave him a good margin of profit, even if he had the experience to manage them. The position is this, that breeders, almost without exception, value their pullets as a commercial proposition at a rate many times higher than was anticipated. This, then, brings the would-be purchaser up against his first problem—how to get his stock

One way to start.

Undoubtedly the best way to commence poultry-farming, when experience has to be gained, is to start at the bottom—that is to say, start with a few breeding pens of well-bred stock, and give the first year to hatching a stock of breeders for the following season. In this way much experience will have been gained before spreading out into larger numbers, and no net profits should be expected while breeding-up. Profits on the running can only be

calculated upon a stock-taking basis, and this should form one of the first entries in the farm books. The stock purchased, and the buildings and equipment installed, should be all set out in books kept for the purpose, the one under the heading of "stock," and the other as "plant." Stock-taking, at a given date, should be a feature each year, and all new plant should be set down at cost price, and each succeeding year a percentage of depreciation struck off according to the estimated life of the construction. The stock should be set out at sound commercial values, and then by keeping strict account of income and expenditure, the accumulated values or profits, as the case may be, can be determined.

Area of land required.

The area of land required will, of course, be in proportion to the anticipated extent of possible operations. Of late there have been systems claiming to be able to run so many thousands of poultry to the acre, but I am not endorsing any of them. It may be set down that if one is to make a living on the average country taken up for poultry-farming, 5 acres is the minimum that can be advised. On this area it is possible to run 800 to 1,000 layers, and to raise the necessary stock to maintain that number. It should be remembered that as a working proposition the new stock has to be raised before the old stock is off the farm. Therefore, it means that when 1,000 layers are being carried, and assuming that the entire 1,000 are to be replaced in two years, it will be necessary to hatch each year about 1,250 chickens. This is allowing 50 per cent. to be cockerels, with a 20 per cent. loss in rearing, the resultant pullets numbering 500. Thus it will be seen that on a farm of 1,000 layers close upon a number equal to 2,000 adults has to be carried in the rearing season, because the young ones are practically reared before the 500 old ones are disposed of. While I set down 5 acres as the minimum area upon which 1,000 layers might be carried, it would be better to have double that acreage, particularly if the soil is of a clayey nature.

The right time to start.

The right time to commence making dispositions for starting to keep poultry on the above lines is in the late summer or early autumn. Pens should be erected and the breeding stock acquired, if possible, by May, so that the birds can become settled in the pens before the winter. Although stock often do very well when purchased later, it will be found best as above recommended. Everything is then in order; the birds start laying, and an early start can be made with the incubators.

In purchasing stock, preference should be given to spring-hatched birds; July and August in the heavier breeds, and August and September for the Mediterranean breeds, such as Leghorns.

Another way in which a start can be made is to procure incubators, purchase eggs in the spring, incubate them, and rear the chickens, then proceed as above recommended. And still another way is the day-old chicken; but neither of these methods of making a start is likely to prove

so satisfactory as the first. The principal reason for this is that, in the first place, the business is not entered upon in a way calculated to inculcate the elements of poultry-keeping, and is not starting at the bottom. But the greater objections to this method are, that one cannot be sure what class of stock the eggs or chicks have come from, as if from one's own stock handled under supervision. And still another thing is that there is often difficulty in getting orders filled as early as required, and a few weeks' delay at the critical period will be found to have frittered away the most valuable time for hatching and rearing, and leave one with nothing but late hatchings, which are always a handicap from the start, calculated to ruin the prospects of the first year's operations.

Incubators and brooder equipment necessary.

Assuming a start to be made with 40 breeders about 1st July (the time to start hatching), one-third as many eggs as there are hens is a fair estimate of the laying at that time. This would give 13 eggs per day, or about 93 per week. Ten per cent. will probably have to be rejected as unfit for setting, leaving, say, 80 eggs fit for incubation. This quantity will keep increasing as the spring approaches. There is no objection to starting a 120-egg or even a 140-egg incubator with this quantity if they cannot be made up. The eggs from now on should be a steadily increasing quantity. Therefore, if full incubator capacity was obtained at first, more would be necessary very soon. This means that for 40 breeders at least three incubators of a capacity of from 110 to 140 eggs each, according to the make obtained, will be required to handle these eggs for incubation, because, to be successful with incubators, the eggs should not be more than a week old. If it is desired to hatch more than three incubators will turn out, there should be sufficient eggs coming from the 40 hens in August to warrant another incubator. To accommodate the chickens coming from the incubators, and presuming that the chickens are to be kept under heat for five or six weeks—which is necessary in the early spring months, at any rate—two brooders to each incubator employed is a working proposition.

In regard to the management of incubators, if the operator has had no previous experience, perhaps the safest plan is to follow the instructions that are issued with each machine by the makers, because one set of instructions would scarcely be applicable to all makes of incubators, except in so far as temperatures are concerned, and even this is more or less subject to the position of the thermometer in each. Some are placed on a level with the eggs, and others suspended above, which would make in some instances a difference of a degree or more. This will be allowed for in the instructions of any good standard machine. One thing, however, that is not generally included in the maker's instructions is this, that it is necessary for the operator to anticipate approaching changes of temperature by a slight regulation on whichever side it is expected in advance of heat or cold striking the machines. The question of rearing chickens and operation of brooders will be dealt with later.

Seasonable Work for Poultry-Keepers.

JAMES HADLINGTON.

MAY.

The Hen to Breed from.

THE most important work on the poultry farm this month will be the arrangement of the breeding pens, and preparations for the hatching season. Where the breeding stock has not already been mated, this should be attended to without delay. In selecting the breeding stock, it is important that the factors of development and other indications of a vigorous constitution should be taken into account. Greater weight should be given to the development and other qualities than is apparently given in many matings one comes across. A most pernicious idea appears to be gaining ground in regard to the qualifications of a hen for breeding. The number of eggs she will lay is apparently the only passport to the breeding pen, regardless of development or constitution. By all means let us have the prolific hens for this purpose, but let us see to it that they are otherwise qualified. The foundation of success in poultry-keeping is ability to hatch and rear strong, virile chickens, and these can only result from strong, well developed, well cared for parents. This also applies to the subsequent egg production. Therefore it follows that if a hen is weedy and run down, she is not a fit subject for breeding, no matter how many eggs she has laid. But it does not follow that a good layer should be discarded as a breeder. That would be going to the other extreme; but what should be insisted upon is bodily development of sufficient proportions and strength as will indicate a breeder of robust stock. On the subject of mating, readers are referred to the article on "Mating for Utility Purposes" in the *Agricultural Gazette* for February.

Yard Accommodation.

Next to the quality of the stock itself, the conditions under which it is kept is of the utmost importance. Almost everyone will admit that a good range and plenty of exercise afford the ideal conditions for breeding stock; but the average poultry farmer with his big quantities to hatch, and the necessity for keeping control and particulars of his breeding stock, is confronted with the problem of a lot of breeding pens, which puts extensive range out of the question. Penning in bare yards, with no means of exercise for the birds, is one of the causes of poor results. This difficulty it is admitted, under certain conditions, is not easy of solution; but very often it is possible to amend the conditions once it is realised that a weak spot exists. Very few breeders, except on a small scale, are so situated that they can give the ideal conditions to their breeding stock. The small yard is a necessity incidental to handling many breeding pens, and mechanical aid must be brought to the assistance of unnatural conditions.

The Scratching Shed.

Perhaps the nearest practical solution of the difficulty is found in providing a scratching shed in addition to the roosting quarters, in which either litter or horse manure is used for the material to scratch in. In case of litter being used, it is advisable to have either sand or dry loam spread over the floor a couple of inches deep, and the litter on top about 6 inches deep. The latter must be kept dry, or very frequent replacements will be necessary, making the system more costly in upkeep. This also necessitates cemented floors in the houses; but as the breeding pens only constitute a small portion of the poultry farm construction, it will be found money well spent.

A variety of conditions under which the birds are penned will suggest different methods of providing, not only the scratching compartments, but the material to be used in them. In many places straw litter will be a commodity not easily obtainable except at prohibitive rates; but some other material is often available at little cost. However, whatever can be used, provides a medium in which the evening feed can be thrown and partially buried early in the afternoon, so that the birds have a few hours in which to scratch and work it out, giving them exercise where they would otherwise be moping around waiting for their feed. This at least is one way in which the enforced confinement can be ameliorated. This system has enabled many prominent fanciers to keep birds in small suburban yards and turn out fine large vigorous stock, winners in many shows, and it is a system which utility breeders could copy to advantage, as far as is found practicable. To get over the hard, bare yard conditions, many poultry-keepers resort to digging them up; but lengthy experience proves this not only expensive, involving too much hand labour, but it can be condemned on other accounts. It is principally advocated as means of sweetening the ground; but as a matter of fact it is the one way to get it tainted, except where alternate yards are provided and cropped; but this is more expensive than the above.

A Modern Plant.

A class of breeding pen designed by the writer to meet these conditions can now be seen on the Hawkesbury Agricultural College new poultry plant. The house portion consists of a long shed 90 feet long by 6 feet 6 inches wide, divided to give 10 feet for each breeding pen, which is again divided, allowing 5 feet for the roosting quarters, and 5 feet for the scratching shed. The scratching shed portion is enclosed at front with the exception of an aperture of 12 inches at the top, which is wire netted, and a partition 20 inches high divides it from the roosting compartment, which is open at the front. This partition is for the purpose of keeping in the litter. The idea of so enclosing the scratching compartment is to keep the scratching material dry, and also to provide cool shade while allowing the sun to shine into the roosting portion, which is an advantage from a sanitary point of view. The entire shed is 6 feet high at front with 5 feet at back, and the nine pens have yards 40 feet deep, and gates at front. The back of each

section faces a roadway 30 feet wide, and doors are provided to each pen at the back to allow of manipulating and attending to the birds without the necessity of treading the yards.

Another System.

Another system not very generally adopted is practicable where only one breed is kept, or where extensive range can be provided for two or three different flocks. This consists of running 100 or more hens in a flock, with ten to twelve roosters, and which gives very much better results in fertility than would be supposed. But as can be readily understood, this method does not lend itself to any fine points in breeding; it is simply a rough flock system which necessitates bringing new roosters to each new lot of breeders, and is under the disadvantage that any rooster that is incapacitated cannot be replaced in the mob. To provide for this, two or three more roosters than actually required should be put in at first; this then allows for possible failures. However, as a matter of experience, fewer roosters are required than in small single penning; but this system will not work satisfactorily in confined spaces.

Preparing for Hatching.

Incubators, brooders, and all such equipment should now receive a thorough overhauling, preparatory to commencing operations. True, eggs will be scarce for some little time yet, and while it is not recommended that many chickens should be hatched out between this and July, so far as layers are concerned, it is desirable that a small commencement be made to get everything in working order by the time more eggs are available, and the small number of chickens so hatched will prove very useful for early mating next year.

The Nut Grass Coccid.

A couple of correspondents have recently applied to the Department for information with regard to the coccid which destroys nut grass.

In reply, Mr. Froggatt, Government Entomologist, stated that the Nut Grass Coccid (*Antonina australis*) feeds upon the nut-like roots of the nut grass in the grass and lucerne paddocks of the Hunter River district. It will kill out the nut-grass if the land is not disturbed, thus allowing the coccids to thrive; whereas if the ground is ploughed they die out. A number of experiments have been carried out by transplanting scale-infested nut-grass in other districts but without much success, as it appears to be difficult to establish it under new conditions, although it has been known to be successful in some districts.

The parasite is peculiar to the nut-grass, which is really a sedge and not a true grass. It has never been found on any useful crop or grass.

The parasite does not travel through the soil unless it can follow the roots of the nut-grass, but it may be spread by very carefully turning over the ground, causing the minute larvæ to be distributed over the paddocks.

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

Branch.	Honorary Secretary
Albury	Mr. J. D. Lankester, Albury.
Baan Baa	Mr. P. Gilbert, Baan Baa.
Balldale	Mr. H. Elrington, Balldale.
Bathurst	Mr. J. McIntyre, Orton Park.
Batlow	Mr. A. C. Arnot, Batlow.
Beckom	Mr. S. Stinson, Beckom.
Bonville	Mr. H. B. Faviell, Bonville.
Borambil	Mr. H. A. D. Crossman, "Homewood," Quirindi.
Bungalong	Mr. G. H. Pereira, "Springdale," Cowra Road, *vià* Cowra.
Canadian	Mr. C. Smith, Canadian Lead.
Cardiff	Mr. F. B. Cherry, Cardiff.
Carlingford	Mr. D. K. Otton, Carlingford.
Cattai	Mr. A. J. McDonald, Cattai, Pitt Town.
Collie	Mr. C. J. Rowcliff.
Coonabarabran	Dr. F. G. Failes, Coonabarabran.
Coradgery	Mr. J. Clatworthy, Beechmore, Millpose, Parkes.
Coreen-Burraja	Mr. N. B. Alston, Coreen, *vià* Corowa.
Cowra	Mr. E. P. Todhunter, Cowra.
Crudine	Mr. F. W. Clarke, Crudine.
Cundletown	Mr. S. A. Levick, Roseneath, Cundletown.
Deniliquin	Mr. W. J. Adams, jun., Deniliquin.
Derrain	Mr. A. P. Hunter, Red Bank Creek, Matong.
Dubbo	Mr. T. A. Nicholas, Dubbo.
Dunedoo	Mr. G. E. Alexander, Dunedoo.
Erudgere	Mr. Frank Hughes, Erudgere.
Fernbrook	Mr. W. Marks, Yarrum Creek, Dorrigo.
Forest Creek	Mr. W. Thompson, Forest Creek, Frogmore.
Garra and Pinecliff	Mr. A. S. Blackwood, "Netherton," Garra, *vià* Pinecliff.
Gerringong	Mr. J. Miller, Gerringong.
Grenfell	Mr. G. Cousins, Grenfell.
Gunning	Mr. E. H. Turner, Gunning.
Henty	Mr. H. W. Smith, Henty.
Hillston	Mr. M. Knechtli, Hillston.
Inverell	Mr. W. A. Kook, Rock Mount, Inverell.
Jerrara	Mr. A. O. Lane, Public School, Mullengrove, Wheeo.
Jiggi	Mr. D. Gibson, Daru Farm, Jiggi.
Jindabyne	Mr. Sylvester Kennedy, Jindabyne
Katoomba	Mr. C. Wooller, Oliva Park Farm, Katoomba.
Keepit, Manilla	Mr. J. B. Fitzgerald, Keepit, *vià* Manilla.
Kellyville	Mr. Joseph Nutter, Kellyville.
Kenthurst	Mr. J. R. Jones, Kenthurst.
Leech's Gully	Mr. J. Donnelly, Leech's Gully, Tenterfield.
Leeton	Mr. C. Ledwidge, Farm 442, Leeton.
Little Plain	Mr. F. S. Stening, Little Plain, *vià* Inverell.
Lower Portland	Mr. W. C. Gambrill, Lower Portland.
Mangrove Mountain	Mr. G. T. Hunt, Mangrove Mountain, *vià* Gosford.
Martin's Creek	Mr. P. Laney, Martin's Creek, *vià* Paterson.
Meadow Flat	Mr. F. J. Brown, "The Poplars," Meadow Flat, *vià* Rydal.
Middle Dural	Mr. A. E. Best, "Ellicsleigh," Middle Dural.
Milbrulong	Mr. O. Ludwig, Milbrulong.
Moruya	Mr. P. Flynn, Moruya.
Narellan	Mr. G. J. Richardson, Narellan
Narrandera	Mr. C. F. Pearce, Narrandera.
Nelson's Plains	Mr. V. Schlaadt, Nelson's Plains
New Italy	Mr. F. A. Morandini, New Italy.
Nimbin	Mr. J. H. Hutchinson, Nimbin.
Orangeville	Mr. C. Duck, Orangeville, The Oaks.
Orchard Hills (Penrith)	Mr. H. Basedow, Orchard Hills, *vià* Penrith.

Branch.	Honorary Secretary.
Parkesbourne	Mr. W. H. Weatherstone, Parkesbourne.
Peak Hill	Mr. A. B. Pettigrew, Peak Hill.
Penrose-Kareela	Mr. A. J. Bennett, "Brookvale," Kareela.
Ponto	Mr. A. D. Dunkley, Ponto.
Redbank	Mr. J. A. Graham, Woodlands, McAlister, *viâ* Goulburn.
Ringwood	Mr. Wm. Tait, Ringwood.
St. Mary's	Mr. W. Morris, Queen and Victoria Streets, St. Mary's.
Sackville	Mr. Arthur Manning, Sackville.
Sherwood	Mr. J. E. Davis, Sherwood.
Stockinbingal	Mr. J. Neville, Stockinbingal.
St. John's Park	Mr. J. O. Scott, St. John's Park.
Tallawang	Mr. J. E. Hansall, Tallawang.
Taralga	Mr. Dave Mullaney, Stonequarry, Taralga.
Toronto	Mr. J. G. Desreaux, Esmond, Toronto.
Tumbarumba	Mr. R. Livingstone, Tumbarumba.
Upper Belmore River ..	Mr. A. W. Fowler, Upper Belmore River, *viâ* Gladstone, Macleay River.
Uralla	Mr. E. A. Neil, Uralla.
Wagga	Mr. Thos. Fraser, Aberfeldie, Wagga.
Walla Walla	Mr. H. Smith, Walla Walla.
Wallendbeen	Mr. W. J. Cartwright, Wallendbeen.
Walli	Mr. A. V. Bloomfield, Walli.
Wetherill Park	Mr. L. Rainbow, Wetherill Park.
Wollun	Mr. C. E. Burke, Private Bag, Wollun.
Wolseley Park	Mr. H. McEachern, Wolseley Park.
Wyan	Mr. C. W. Harper, Myrtle Creek Railway Station.
Wyong	Mr. Edgar J. Johns, Wyong.
Yass	Mr. Cyril Ferris, Yass.

Demonstrations of Winter Pruning, &c.

A number of demonstrations of winter pruning, &c., are being arranged, the following dates having been fixed:—

Place.	Date.	Officer.
Batlow	May 5 and 6 ...	J. G. R. Bryant, Assistant Fruit Expert.
Albury	,, 8 ..	J. G. R. Bryant.
Cundletown	,, 9	W. le Gay Brereton, Orchardist, Glen Innes Experiment Farm.
Sherwood	,, 12	W. le Gay Brereton.
Cattai	,, 13	J. G. R. Bryant.
Lower Portland... ...	,, 14	,,
Mangrove Mountain ..	,, 22	,,
Leech's Gully	,, 28	W. le Gay Brereton.
Inverell	June 3	,,
Wyong	,, 3	J. G. R. Bryant.
Cardiff	,, 4	,,
Toronto	,, 5	,,
Martin's Creek	,, 11	,,
Kellyville	,, 18	,,
Carlingford	,, 19	,,
Orchard Hills	,, 23	,,
Katoomba	,, 25	,,

REPORTS AND NOTICES FROM BRANCHES.

Borambil.

The monthly meeting of this branch was held on 11th March, when the members discussed the question of economical feeding of farm horses, and decided that dividing the cost of feed into three parts and feeding two parts value of chaff and one part value of grain, the horses to be fed in stalls, would give the most satisfactory results.

Canadian.

The first lecture of an officer of the Department of Agriculture before members of this branch was delivered on 13th March by Mr. J. W. Mathews, Sheep and Wool Expert, on the occasion of a visit by him to the district. Mr. F. S. Stacey (chairman of the branch) presided, and there was a fair attendance of members, particularly of those who were interested in the subject.

The Farmer's Sheep.

Mr. Mathews dealt with the subject of the "Farmer's Sheep," asking first what constituted one. So far the question had never been satisfactorily answered. Neither could it very well be expected, seeing the wide variety of conditions under which they were working and the different methods of treatment they adopted in the keeping of sheep.

Proceeding, he contrasted the position of (1) the ordinary grazier, and (2) the wheat and sheep farmer.

The former confined his attention mainly to wool-growing, because, being dependent almost entirely on native pasture, he under most circumstances found the Merino the best sheep for his surroundings.

The second class he regarded as being in a much more secure position, because, by combining sheep with cultural methods, they were able to cater for markets and to meet demands that in many instances were beyond the reach of the ordinary grazier.

Comparing the most suitable class of sheep for the conditions outlined, he said that he could never regard the Merino as a "farmer's sheep." There were many who still kept the breed, but he was of the opinion that those who did failed to get the most out of their sheep, and what was required was a class of sheep that would enable them to turn to more profitable account food supplies rendered available by the methods which they employed in cultivation. Stubbles, the pickings of the bare fallow, what appeared from time to time on the areas temporarily out of cultivation, and such-like, were unsuitable classes of feed for a breed like the Merino. Only the shabbiest classes of Merino wool could be grown under such conditions. The farmer should, therefore, consider the class of animal that would do best on small areas, consistent with methods of cropping and food supply. It must be a more gross feeder and one that would return in value the extra quantity of food consumed. Such requirements would be best found in a crossbred.

The raising of lambs for export, breeding from a ewe that at the same time would yield a fair return for its fleece, was therefore recommended. The ewe recommended was the Longwool-Merino cross, Lincoln-Merino being preferred. From this ewe an early lamb suitable for export or local requirements might be raised. The lambs should be disposed of when not more than five months old, and it was therefore essential that the ewes should be joined with rams of early maturing breeds. Purebred rams should always be used, and farmers should see that they secured them from reputable flocks To raise the best class of lamb, selection must, however, be confined to one of the short-wools, but only in the interests of the lambs, not for the wool.

The Southdown x Longwool-Merino produced the best quality of mutton, but was somewhat slower in maturity than some of the other breeds. The Shropshire x Lincoln-Merino combination gave a very shapely lamb of moderately early maturity. For extreme early maturity and body weight he favoured the Dorset Horn, which was also a vigorous breeder. The cross-breeding experiments conducted at the Government farms had shown the Dorset Horn to be a most valuable breed in this connection. Although its crosses were perhaps not so shapely as the Southdown or Shropshire, what it lost in this respect it more than made up on the score of body weight and profitableness.

Haphazard methods must always invite unfavourable results, and should therefore be avoided. To make a success of the plan there should be fixed a certain definite time for everything. Due regard should be paid to the time when the lambs were dropped, the time of marketing, and the planting of the fodder crop.

The rams should be joined with the ewes in, say, December, to ensure the lambs being dropped in the autumn, and marketed in the spring—the earlier the better. Hence they must fully consider the preparation of fodder crops or food of a highly succulent nature for the ewe and lamb. Indeed, the providing of this food supply practically ensured success or failure. From the time that the lamb was born till it was marketed its main food supply was its mother's milk, and the ewe should therefore be of the strong type, well constitutioned, of good milking qualities, and above all adequately fed. Crops should be planted in autumn, so that they might be ready for feeding-off at about a month after the lamb was born. Neither the ewe nor the lamb should suffer a check up to the period of marketing, and all depended on the management and the efficiency of the food supply. Any lambs carried over were kept at a loss, for there was little difference between the value of a twelve months' "weaner" and that of a "sucker."

As regards cropping, he thought that better use could be made of the fallow land than allowing it to lie idle for the full term. It might grow a fodder crop, and thus provide a very necessary class of food for the ewes. If the district were not served by a fair rainfall the position might be different. In the drier districts where wheat-growing was being profitably undertaken, a long bare fallow was perhaps a greater necessity, but here the rainfall was 26 inches, and the conditions therefore different.

Henty.

The following paragraphs are taken from a paper read by Mr. P. W. Smart, Chairman of this branch, at the meeting of 14th February :—

Co-operation.

It seems to me that there are many circumstances at the present time that make the subject of co-operation worthy of attention, because, when the ordinary course of events is being interrupted, perhaps to bring about improved conditions, such an interruption may be more systematically met by united action than if faced individually. I propose to approach co-operation on primary lines, and to treat the subject from the definition that it is the association of a number of persons for their common benefit on the principle of a joint stock enterprise. Having said this, there must not be forgotten the further condition that if the subject of co-operation is to be more than an academic one, it must be faced as one of policy and expediency, and must be recognised in the spirit of self-defensive individualism, and when it can be made attractive to those connected with it and outside of it by good feeling, it strengthens the unity of interest, and is made effective in its intellectual capacity, for at the bottom of co-operation is the education of the people in collective self-reliance. No one to-day, notwithstanding our boasted democracy, would care to question a statement that the higher the civilisation the more marked is the difference between rich and poor, although money is not quite civilisation. One of the things that created the co-operative movement in England was the striking contrast between the rich and poor. Not that the condition of the poor has become worse; we know that it be not so. But the new industrial system in that country emphasised the difference. In the old feudal days there, the same as in our station days here, men could always get bed and board. But the industrial lord recognised no duty of that kind. And the realisation of this, together with the labours of Robert Owen, whose New Lenark venture stands out prominently in the Socialistic propaganda of the early part of last century, gave an impetus to the co-operative movement of the Rochdale pioneers, which established co-operation in England.

If I remember right it is in Wolff's "Co-operative Banking" where it is stated that in handling the subject of co-operation, four things must be recognised, and the first and most important is finance. Then in order follow production, industry, and distribution. With regard to the first of these you know that credit virtually means finance to the farmer and business man, and is the provision of capital, or money, by one party, the lender, to another party, the borrower, in return for security of repayment by the latter. The fee for this money is interest. The money is usually provided by a banker or money-lender, though there is really not the difference between the two in this

country that there is in older countries, and as far as this district is concerned, anyway, the money-lender has proved of greater service of recent date than the banker, no less than £80,000 having been obtained from private sources to enable the ordinary routine requirements of the farmers here to be met. However, just by way of further explanation, let me state that this financial situation is met in European countries by the co-operative credit society or bank, which supplies the producers with money on good terms. The agricultural co-operative society provides the farmer with his materials of agriculture, stock, &c., and takes the raw produce he has raised on the farm and sells it. Then, there is the worker's branch, where men surrender their independence for co-partnership in a concern that make the agricultural products fit for market. Following this is the co-operative store, or distributive agency. You will see from this how these four units of co-operation work independently of each other, yet are dependent one on the other to complete a system. My own opinion is that co-operation as outlined has been the real force to build up the industrial prestige of the German Empire, and that protection has only been a secondary phase of it. However, the co-operative credit societies are banks of a peculiar kind, and assist the class of people who originate and control them. We have nothing like them in Australia, unless it be the Civil Service Association of Melbourne, but I think they will surely come. The credit given is of a personal kind, and such societies are more concerned with the personal character of clients than larger financial institutions. The members know each other as business neighbours, and have no hesitation or fear in applying to the local bank of which they must be members for aid. These banks are admitted to have stimulated honesty and reliability.

Germany is the parent country of co-operative banking, and Herr Schultze, mayor of Delitsch, was the pioneer of co-operative town banks, established in the interests of smaller industries and tradespeople; while Herr Raiffeisen was the promoter of the country or village co-operative banks for smaller farmers. The principles of these banks are somewhat different. The Schultze-Delitsch credit bank is a local association created to provide credit facilities for members only. Each member must subscribe one share. The share is fixed as high as possible, the minimum being about £6. The object of the large share is to provide working capital, and to encourage thrift. It is to the interest of a member to pay up the share, because he receives dividend upon the amount paid up only. The profits are divided in two parts, one goes to a reserve fund, and the remainder to members. An entrance fee is paid, which goes to the reserve fund, and can only be used to cover losses. Special funds may be used from outside persons, and are granted in the form of a simple loan or advance as on the security of a bond or I.O.U., or on a similar basis to the cash credit system of the Scots banks. Cash credits in Germany are usually granted for five years. The other German system—a rural one—is the Raiffeisen, which has no fixed capital, and there is nothing to operate on but the universal unlimited liability of its members. It was intended by its founder as a distinctly Christian act of social service, and such it has proved itself to be. It made personal character the basis of the banking security. It had money provided by wealthy men on that security, and has assisted many an industrious farmer, whose assets were too trifling to gain a moment's consideration from an ordinary bank, forward to success. But no matter what other security a lazy or drunken, or incompetent farmer had to offer, he could not get assistance. The Raiffeisen model further uses the credit society for the supply and sale of agricultural commodities. It has one central bank as headquarters, and one of the reasons for this is that as the loan papers of agriculture cannot readily be bought or sold in the open market, the special organisation necessary is thus provided. Another reason is that in some districts in Germany money is usually abundant, and this can best be obtained through the central office for use in the local branches where required, and where those needing it are known. Raiffeisen and Schultze saw that the private or State bank could not command the support of the respectable poor man, because, being large, it was worked from a distance where those in control are not conversant with local conditions and local men. The Schultze-Delitsch system has combined savings with credit, and established a thorough communication between savings and the use of savings.

One great lesson taught by Germany is that not only can wage-earners and small shopkeepers be benefited by co-operation, as in Great Britain, but that farmers can be effective bankers and co-operative producers, at a small cost to themselves, because they can supply the requirements of good banking, *i.e.*, proximity to borrowers, control of the use of the money or credit, and by honesty and prompt payment reap the benefit of their own industry. To be successful, co-operation must be managed within its own vicinity. So well is this understood by men who are practically concerned in it and competent to judge, that the Prussian Government has allotted 50 million marks with the object of affording credit at a low rate to small producers through their industrial and co-operative banking associations.

Coming then to the subject of co-operative agriculture, the nearest approach to it we have in Australia is the dairying industry. But in Denmark, where the dairying industry is the finest in the world, with a population of 2,600,000, there are 505,000 co-operators, which, allowing four to a family, gives over 2,000,000 getting a living through co-operation. In Germany there are 7,348 agricultural co-operative societies with 560,000 members. Through these societies the produce of the district is to a great extent governed. If wheat is the staple production, the farmer is advised as to markets, class of wheat most in demand, and besides this, the quantity to be disposed of being known to the society, a market is found for it. All supplies of bags, twine, and necessaries are found for the farmer, the co-operative bank doing the financing, he himself being a directing member of it. In fruit, the same applies, and in stock too. Farmers in co-operation grow sheep, or wool, or bullocks, or horses. Any small number may do this. When they have sufficient for a sale, the best are culled out, and offered. There is no over-lapping or over-stocking a market. The manager of the society is kept informed. He gets into communication with buyers, and his stock as selected always brings competition. Of course, large farmers or pastoralists or fruiterers do not require the assistance of co-operation. But in such a district as ours, where mixed farming is coming more and more to the front, this form of co-operation is bound to be an advantage. All it wants is the organisation and the loyalty of the farmers to themselves to be a blessing to them. It is one thing that will establish a reputation for the district in whatever the farmers decide to lay out for themselves. My idea is that our farmers here by co-operation in production are going to do more for themselves than in any other way. This may seem ideal only, but the whole initiation of co-operation is idealistic, and experience has made it practical. It is not money that is required. Organisation and systematised management are the main things—simply men agreeing to carry out a given thing, as they now agree to put in wheat in April, May, and June. The co-operative distributive agency is also in its infancy in Australia, but it has almost always been a success and never a failure, where managed by a competent head and men of average ability.

Mr. H. C. Stening, Inspector of Agriculture, delivered a lecture on "Varieties of Wheat suitable for the district, their characteristics and commercial value," to the members of the above branch of the Bureau on 16th March. There was an attendance of about fifty, including some scholars from the local public school. A *resumé* of the lecture will be given in our next issue.

Leech's Gully.

A non-competitive exhibit was staged by this branch at the Tenterfield Show, on 3rd, 4th, and 5th March, comprising sheaves and samples of grain from the Department of Agriculture, together with samples of produce grown and supplied by various members of the branch.

The exhibit was much appreciated by visitors to the Show.

Leeton.

At the meeting of 6th February, Mr. G. H. Bassett read a paper, from which the following is extracted :—

Bee Culture.

Mr. Bassett explained at the outset that he could only touch the fringe of the subject, and that he would content himself with a few practical hints, answering any questions, in order to assist those on the area who felt inclined to become bee-keepers.

Bee-keeping on the Irrigation Area was very much in its infancy. He would ask the beginner to first of all study "Root's A.B.C.," and acting under its instructions he should use his own common sense, at the same time studying the bees under his care. It would always be well to also procure the advice of a practical bee-keeper in the district. The beginner would thus have the advantage of the practical knowledge of another man who was well versed in regard to local conditions, such as climate and how it affected the bees, as well as the tree and plant culture that would help the honey flow. Personally, Mr. Bassett said, he would be only too happy to assist the beginner on the area when he had the time at his disposal.

In purchasing hives, it was always best to procure the pure Italian bees. The stock would become, in course of time, partly hybrid, on account of the black bee and hybrid bee coming occasionally in contact with the pure-bred bees. The hybrid hive, however, would give a good honey yield. He would recommend a beginner to obtain, say, one hive, and to start operations in the months of August or September. For the handling of the bees and robbing of the hives, it was necessary to wear a veil over the face as a protection against stings. In regard to a cure for bee-stings, all he would advise was to "grin and bear it."

Where the ants became a source of trouble, he had always found the use of carbon effective.

Foul brood was the worst disease the bee-keeper had to contend against, and where a hive was affected in this way, the safest thing was to burn it at once.

Very few of the Yanco settlers were aware of the inducements that bees held out to them on the Irrigation Area. There was not the slightest doubt that it was going to be, and in fact already was, one of the finest places from a bee-keeper's point of view—in Australia. Lucerne is the bee man's best friend. Although it did not seem to produce honey in any great quantity, there was a slight continuous flow of honey from early spring until well into the winter, ensuring that the queens would lay right up to the cold weather, sending the colonies into winter strong, and well supplied with young bees—just the conditions that reduce winter and spring losses to a minimum.

Apart from the lucerne, there were five distinct varieties of eucalyptus, including Yellow and Black Box, and Red Gum; and judging by the growth the Sugar and Blue Gums had made at the Yanco Experiment Farm, they would be able to add these two species to the list of honey-producing flora in the near future.

The results this year from the bees already on the area were splendid, notwithstanding the winds that had blown almost continuously since Christmas, and so furiously at times that one would think every bee would be blown off the face of the earth. Up to date he had extracted nearly 500 60-lb. tins of honey, and had the weather been favourable, he felt confident he would have doubled the quantity. The sample was good, and very dense. He had placed 7 tons in one order, at 3d. per lb., in buyer's own tins, at the apiary.

One of the greatest drawbacks to the bee-owner on the area was the absence of proper inspection of bees coming into the area. He knew that foul brood had been introduced there, and it behoved the authorities to move in the matter, that was if the industry was to be put on a sound footing. They had, perhaps, a score of promising young bee-keepers among the settlers who, with a little advice and expert instruction, would see to it that no honey went to waste; and judging from the quantity of honey his own bees had gathered in, say, a 4-mile radius, it would be safe to say that quite 150 tons of honey had gone to waste this year at Yanco.

At this point the question was asked, what would be a fair average quantity of honey per hive in an average year?

Mr. Bassett replied that it would be about 100 lb. The chief essential to big averages was having all hives strong, and in good order the moment the honey flow started. To have them ready in time, one must have a perfect knowledge of the times at which the different timbers in his vicinity would commence to bloom. Failing this essential knowledge, instead of having his bees just ready to commence storing honey, the beginner would probably be very busy artificially increasing the number, thinking thereby to secure more honey. It was always better to have the majority of hives in honey-gathering condition at all times. If increases were needed, a certain number of hives could be devoted to that purpose. Instead of getting out increases by natural or artificial swarming, it was safer at all times to keep big, strong hives ready at any moment to start gathering honey; and to secure the increase from hives that were not in a condition to store honey.

Suppose it was desired to increase an apiary of twenty hives to double that number. It would be far better to keep fifteen in honey-gathering condition, and to divide the remaining five into twenty nuclei, securing the queen cells for this purpose from one of our best hives.

To keep the fifteen from swarming, and thus lessening their numbers, they must always be given plenty of room, and to do this two sets of worker combs were needed.

The moment the first box of comb was fully occupied, the second set of worker comb should be placed on top. Remove four combs from the bottom box into the super, replacing them with the four taken from the top. The queen would now have the run of fifteen worker combs, thus ensuring ample room. Under these conditions, he had rarely found a hive swarm. If left thus until the honey flow commences, the bees had no further desire to swarm, their time being fully taken up storing honey. At this stage select the best eight pieces of brood, and place them in the bottom box with the queen, put on a queen excluder, and the remainder of the brood in the upper storey, another box of drone comb on top, and they would be what a bee-keeper would pronounce "ready for action."

Little Plain.

At the March meeting of this branch, Mr. F. Ditzell, Assistant Inspector of Agriculture, gave an interesting and instructive lecture.

Wheat Culture.

Mr. Ditzell remarked that the elevation of Little Plain meant a fairly long winter suited to the growth of late maturing varieties of wheat like Cleveland, Yandilla King, Marshall's No. 3, and Rymer. The soils were generally strong black loams with lighter chocolate and red loams. The black soils were very rich, and crumbled readily on the surface when ploughed, on account of a high lime content, which checked the loss of moisture. These soils were inclined to crack badly when dry, and when wet were very sticky, and consequently were expensive soils to work, but they yielded heavy hay crops. The chocolate and red soils were generally better for grain production, as they did not force such a heavy growth and were easier to work. Where they contained a good percentage of clay they also set hard in dry weather.

Humus was formed by the decay of vegetable and animal matter in the soil, and was a source of plant food, especially nitrogen. It greatly improved the mechanical condition and moisture-holding capacity of soils, and the soil bacteria were constantly breaking it down and utilising it. Therefore, stubbles and weed growths should be ploughed under to maintain the humus content of the soil. It was unwise to plough in a heavy growth of straw if the soil was to be cropped soon afterwards, for it was a hindrance to cultural operations and kept the soil too open. Where the straw was scanty or where the land was not going to be cropped for some time the straw should always be ploughed in. Where straw was burnt the organic matter was destroyed, and only the inorganic or mineral matter was returned to the soil.

In order to maintain fertility continuous cropping with one class of crop should be avoided, and a rotation of crops practised. Different classes of crops took the plant food necessary for their growth from the soil in different proportions. The soil was also prevented from becoming "sick" of one class of crop. The rotation of maize with wheat enabled the land to be kept cleaner, and where take-all was present the growing of oats in rotation with wheat would check its spread. A practical rotation that might be suggested for this district was maize in rotation with wheat every second or third year, or as circumstances permitted. Oats might also be included occasionally where take-all was troublesome. In years to come rape would also be grown in rotation with wheat on the sheep and wheat farms.

The richer and newer soils would probably not require manuring for wheat for many years to come. This opinion was borne out by the results obtained from the manurial trials conducted by the Department of Agriculture on Mr. W. Tonkin's farm at Delungra, where both superphosphate and sulphate of potash had been tried. On the lighter red soils and the older cultivated paddocks manuring was more likely to prove profitable.

The Inverell average rainfall for thirty-five years was 30.21 inches, and an examination of the monthly averages showed a heavier summer than winter rainfall, which emphasised the necessity for summer fallowing to conserve the summer rains. In some of the southern wheat districts, where the annual average rainfall was less than in the north, there was actually as much or more rain during the wheat-growing season than in the Inverell district, and yet they found it necessary in the south to fallow in order to reap the most beneficial results.

Summer fallowing consisted of ploughing as soon as the harvest was over. Thorough ploughing was important, and 4 to 5 inches was a good average depth to plough. The use of the mould-board plough was preferred as it left the land rough and cloddy, while the disc plough left it flat and fine so that it readily set after rain. Where the ground was hard, this objection did not apply to the disc plough, and it was really a necessity in very weedy or stubble land.

The ploughing was necessary to let the rain into the soils, but after rains on this ploughed ground cultivation was necessary to maintain a loose, friable, but not too fine, surface, in order to conserve the moisture in the soil, and also to prevent weed growth. The rains received should decide the amount of cultivation required. Generally two or three cultivations were sufficient, and the skim plough, spring-tooth cultivator, and harrows might be used as required. The first was a good weed destroyer when the weeds were too forward for the spring-tooth cultivator, but the latter and the harrow both covered the ground quickly, and were economical to use. They maintained a mulch and destroyed young weeds. The objection to the disc cultivator was that it left the soil too flat and fine, but it was a good weed destroyer, and if used on the fallowed land it was best used near planting time. All these cultivations should be no deeper than was required to kill the weeds and maintain a nice mulch.

A clean, good sample of seed should be sown. Well-graded seed was the best, as it gave more uniform heading than ordinary seed. The treatment recommended for bunt was to dip in a 1½ per cent. solution of bluestone (1½ lb. bluestone to 10 gallons water) for five minutes, removing any bunt balls present and stirring thoroughly to wet every grain. Owing to the caustic effect of the bluestone on the seed it was then advisable to dip for about three minutes in a solution made by adding 1 lb. of freshly-slaked lime to 10 gallons of water.

The best months to sow in that district were May and June. Earlier sowing led to rank growths and lodging and frosting. Later sowing did not give such good results as seasonable sowing. The slow-growing varieties like Cleveland, Yandilla King, Marshall's No. 3, and Rymer should be sown earlier in the sowing season than a mid-season variety like Federation, while Bunyip and Comeback, which were quick-growing varieties, should be sown late in the season. The varieties mentioned had been proved to give the best results in the district. Bomen was a promising new Departmental crossbred and gave satisfactory results on Mr. W. Tonkin's Government experiment plots last season, and the same might be expected of Nardoo, another new Departmental crossbred, and Commonwealth, a new crossbred emanating from the Victorian Department of Agriculture.

The quantity of seed to be sown varied according to time of sowing, the stooling capacity of the variety chosen, the size of seed, the condition of the ground, &c. For early sowing on well-prepared land of the late maturing varieties, which were all good stoolers, from 40 lb. to 45 lb. of graded seed per acre was sufficient. This quantity should be increased to 50 lb. or 55 lb. per acre as the season advanced. Federation should be sown at about the same rate per acre. Bunyip and Comeback, which were sown later in the season and were also scanty stoolers, should be sown at the rate of from 50 lb. or 55 lb. per acre to a bushel per acre for very late planting. These quantities were for drilled wheats. When broadcasted the quantities per acre should be slightly increased.

The rich soils and rainfall favoured large growth, and that would be enhanced by good preparation of the land. To avoid excessive growth they should not sow too early. When in June or to mid-July the growth was too forward, it should be fed-off with sheep, feeding-off rapidly in fine weather to avoid tramping. It was necessary to feed-off before the crop started to spindle, and harrow afterwards.

The growing crop was often improved by harrowing, even until it reached a height of 10 inches. When the surface became crusted as a result of rain, harrowing would be beneficial in loosening the surface and conserving moisture, also in destroying young weeds. Where the surface naturally remained loose there was no necessity to harrow, indeed harrowing then would pull the plants about considerably.

A hearty vote of thanks, carried by acclamation, closed the meeting.

Martin's Creek.

The usual monthly meeting of this branch was held on 12th March, there being a good attendance of members.

A paper was read by Mr. A. J. C. Vogele, on the subject "Can Dairying and Fruit-growing be carried on successfully together?"

Dairying and Fruitgrowing in Conjunction.

Mr. Vogele said: I do not wish to myself decide the question asked above, but to simply give my experience, having carried on both for a number of years. I wish it to be understood that I am talking of the man who goes on practically uncleared bush land, with very little capital, as quite a number of men have done around here. It is well known that the land about the coast is heavily timbered, and the clearing was, and is still, a big item, despite more up-to-date methods, such as the use of explosives, &c., and from the time the land is being cleared till the trees bear sufficient to keep the house, and give the farmer a decent return, the man without capital must have some other source of income that will yield a quick return. This dairying will do.

Fruitgrowing is in my opinion a preferable occupation to dairying, and it leaves a man a little more at liberty. However, it has its drawbacks. For instance, the fruitgrower is at the mercy of a single hailstorm—such a one in November, 1899, reduced my income to 5s. 9d. for the whole of my crop, and also damaged my young trees to such an extent that quite a number of them never fully recovered. Another drawback is lack of legislation to prevent nurserymen from sending out trees not true to name and often diseased, also old staggy trees that have been kept small through being lifted during their growth. The latter never make good trees.

There are some men who make splendid dairymen but very poor orchardists, and others who are just the opposite. Such men should decide for which business they are best suited, and then work that into the main branch. It must not be forgotten that fruit, to show and keep well, must be picked during the cool of the day, just about the time when the cows have to be attended to. Where there is a dairy, too, ringbarking and scrubbing will have to be done, and that just about the time when the orchard will want attending to in regard to cultivating and pruning, or when new ground should be prepared for planting more trees. You cannot grow fruit and grass on the same piece of ground, and unless the trees have been looked after, both in pruning and cultivation, the size and quality must suffer.

If dairying is carried on in conjunction with fruitgrowing, one is usually subordinated to the other, but in the hands of a man with a fair-sized family both businesses could be made to pay, and after a few years, when the paddocks are getting under grass and freed from scrub and undergrowth, with the usual adjuncts such as pigs and poultry, a very good all-the-year-round income can be assured by the owner of a moderate-sized farm.

During the discussion which followed, the general opinion was that the two businesses could be successfully carried on together in a district like Martin's Creek.

A paper on "Onion Growing" was read by Mr. A. Beavis at a meeting of the branch, held on 2nd April.

ONION GROWING.

Mr. Beavis said: In selecting a piece of ground for onion growing a rich friable loam will usually be found best. The heavier black soils will usually produce a slightly heavier yield, but the onions will take longer to mature. The ground should be ploughed about 6 inches deep in the beginning of January and then left for a month, when it should be harrowed down and ploughed shallow a second time. From then on till April it should be kept well worked with both harrow and roller to kill all the weeds. The ground must be well rolled before the seed is sown so as to have a solid surface.

The seed should be sown about the middle of April in drills 10 or 11 inches apart, according to the quality of the soil. Hunter River Brown Spanish and Giant Gibraltar are two of the best main-crop varieties for this district, and Silver Skin for a late crop, which can be sown in June or July. Second year seed can be sown a month earlier than new seed, for if new seed is sown before the middle of April the onions are liable to run to seed. Good seed usually costs 20s. per lb., and 3 lb. of seed will sow an acre. When the seedlings appear the hoe must be used freely to keep down the weeds, care being taken not to break the solid crust any more than can be helped.

Onions improve by being grown in the same ground year after year, so that if the ground is kept thoroughly clean for the first crop it will be much easier kept clean for succeeding crops.

The onions will be fit for bunching in five and a half months and for bagging in seven months. The tops should be lying down before the bulbs are considered fit for bagging. They should then be dug and the tops and bottoms cut off, and if it is intended to store them the best way is to spread them out on wire netting. Onions for storing should be harvested and carted in during the cool part of the day.

An average crop is 8 tons per acre, although I have seen 15 tons to the acre on several occasions. The usual price for bagged onions is from £6 to £8 per ton. Onions sold in bunches of four at 1s. per dozen bunches average about £15 per ton, but onions for bunching must be very early. I have often made £50 per acre, and this may be taken as a fair average.

DEPARTMENTAL NOTE.—It is considered that 8 tons per acre is too high. Five tons would be nearer an average yield. Probably Mr. Beavis is referring to his own district. The usual price for seed is 8s. to 10s. per lb., and very seldom is 20s. per lb. asked, except perhaps for new varieties.

Meadow Flat.

At the meeting of this branch on 14th March, the paper entitled "Discing Stubble Land before Ploughing," by Mr. H. C. Stening, Inspector of Agriculture, which appeared in the January *Agricultural Gazette*, was read and discussed with much interest.

Narrandera.

At the meeting of the above branch held on 14th March, the secretary, Mr. C. F. Pearce, read an interesting paper.

THE PAST SEASON.

In the past season the rainfall, a little over 16 inches, was well and evenly distributed throughout the year, the first good rain being on the 2nd of January. This was followed by fair rains up to the middle of March, but there was then a long dry period up to the end of the first week in May. This had

a bad effect on the germination of some of the early-sown crops, a good bit of the seed malting, causing the crops to come up thinly. The remainder of the season, taken as a whole, was very favourable to the wheat crop, and also for fallowing. A fair abundance of feed throughout the year kept all classes of stock in good thriving condition, and ensured profitable returns from dairying. This industry is altogether too much neglected in our locality, now that we have such a handy, profitable market at Leeton for all the first quality cream that can be supplied. The greatest setbacks of a very successful season were the heavy and continuous winds at harvest time (which caused a serious loss of grain), the very high price of cornsacks, and the low price of wheat for early delivery. As a whole, the crops in our locality, and right through to Boree Creek and Lockhart, were equal to about the best in the whole of Riverina, and the sample was equal to the very best that I have seen during my forty years of farming experience in Australia. The popular Federation wheat, as the main crop, sustained its prestige for resistance of storms and good yielding qualities.

Orangeville.

A very instructive lecture on "Colic in Horses and Treatment of Wounds" was delivered to the members of the Orangeville branch on 12th March by Mr. Oliver, M.R.C.V.S. Over thirty members were present, and all expressed themselves well pleased with the information imparted.

Mr. Oliver described the different kinds of colic, their causes and cures, telling his listeners how to treat a horse if away on the plains where no remedies were available, how to treat him at home on the farm if the proper medicines were not to hand, and what to give him if the right mixture was procurable.

The different kinds of wounds were also described, and methods of cleaning, dressing and sewing up were explained in language which all could understand. Those of the audience who, before the lecture commenced, were under the impression that the lecturer would recommend remedies which would be hard to obtain, were agreeably surprised to find that such was not the case. Many of the medicines and lotions spoken of could be easily obtained, and in many cases are actually kept on hand by thoughtful farmers.

Mr. Oliver answered many questions relating to different diseases of the horse, and was accorded a hearty vote of thanks.

Parkesbourne.

This branch held its usual monthly meeting on 11th March, when there was a good attendance.

Some very good specimens of locally-grown fruit were exhibited at the meeting.

Mr. H. Grunsell read a paper on the use of gelignite as an explosive, explaining its uses on the farm and in the orchard.

Ponto.

This branch held its usual monthly meeting on 11th March, when there was a good attendance.

Question Box.

The evening was devoted to the "Question Box," some of the questions discussed being as follow:—

(1) Which is the more profitable industry in this district—wool or wheat growing?

Mr. L. A. Stuart, speaking from practical experience, said that a combination of the two was the more profitable. Taking one without the other, if the farmer worked the land himself without employing much labour, wheat was the more profitable.

(2) What is the best method of procedure as regards the fallowing of land?

This question was discussed generally, many different opinions being expressed. Keeping the land mulched and free from weeds was favoured.

(3) What is the most suitable depth to plough for wheat?

The members were mostly in favour of ploughing deep (7 inches) for early, 4 or 5 inches for mid-season, and shallow for the late sowing.

The following questions had also been asked by the Secretary, and answered by the Department of Agriculture as indicated:—

Question.—What is the best size of windmill to lift water 45 to 50 feet; and which would be the greater strain on the mill—to have a 1½-inch pipe above a 3-inch cylinder pump, or a 3-inch pipe above a 3-inch cylinder?

Answer.—Presuming that the distance stated is from the suction to the point of delivery and that the mill would not be sheltered from the prevailing winds, a 12-foot mill would be ample, and a 1½-inch delivery pipe would be suitable.

Question.—Is castor oil and resin a good preparation for leather belts, or does it injure the leather?

Answer.—If the mixture is intended to make the belts grip, the resin only, powdered and sprinkled on the belt when in motion, will be found sufficient. Castor oil will not injure the belting.

Question.—Which gives the more beneficial results, fertilising early or late wheat crops?

Answer.—A system of manuring is almost essential for both early and late-sown varieties of wheat in most of the wheat districts of the State. If the soil be deficient in phosphoric acid, artificial manure in the shape of superphosphate is essential, whether the seed is sown early or late. Returns from the Farmers' Experiment Plots have proved that equally good results are obtained from manuring late-sown varieties of wheat as from manuring early-sown ones.

Sackville.

At a meeting of this branch on 5th March, a paper entitled "Culture and Agriculture," which indicated the manner in which modern science and education are modifying and improving the methods and the lot of the tiller of the soil, was read by Mr. C. Kaiser.

Taralga.

On Thursday, 12th March, Mr. C. J. Sanderson, M.R.C.V.S., visited the above branch, and gave a demonstration of spaying at Mr. Johns' farm. A goodly number of dairy men were present, and keen interest was displayed in the proceedings.

A cow was first slaughtered for anatomical demonstration, the genital organs being shown and their positions explained. Owing to the dry weather prevailing it was not deemed advisable to operate on many cows, but Mr. Sanderson spayed one, and then, under his supervision, a local lad operated on another, doing the work most expeditiously. Mr. Sanderson's explanations and demonstration were very clear

At night a lecture was given on contagious abortion and mammitis. The diseases were both explained, their treatment and prevention being fully dealt with. In the case of mammitis, the lecturer warned his hearers against the use of so-called cures, showing clearly that prevention was the only cure.

At the conclusion of the lecture a number of interesting questions were answered.

The lecturer received a hearty vote of thanks, and the hope was expressed that he would pay another visit in the spring.

Upper Belmore River.

A lecture on ensilage and the conservation of fodders was delivered by Mr. G. Marks, Inspector of Agriculture, on 12th March, at Belmore River, under the auspices of the local branch of the Agricultural Bureau.

Conservation of Fodder.

Reference was made, in opening, to the severe drought which had prevailed throughout the coastal district, and the serious effect it had had upon the dairy returns. Too much reliance was placed upon the natural pasture, and too little provision was made to tide over periods of drought. On the rich alluvial flats lucerne succeeded well, but this king of fodders was not grown as extensively as it ought to be, and it was also plainly evident that its high feeding value was not universally known. Lucerne was capable of producing large quantities of fodder in one season, which could be fed in its green state or preserved in the form of hay or ensilage. When the weather conditions permitted it was best preserved as hay, in which state it could be fed on the farm or marketed, but should the season be showery, such as usually prevailed during a considerable part of the autumn, then it need not go to waste, but could be preserved, either by itself or in combination with other crops, as ensilage.

There were few soils which would not grow heavy crops of maize for green feed. It was an easy crop to deal with right throughout its growth, and from 15 to 30 tons could easily be obtained from an acre. There were also many other crops, such as sorghum, cowpeas, fieldpeas, millet, root crops, &c., which succeeded well on the coast, and which would fit in well with a farm rotation. A few acres of land devoted to these crops would provide much more feed than if left to pasture alone. There were two dangers which dairymen and farmers on the Belmore River and other coastal areas were subject to, viz., scarcity of feed as the result of protracted drought and scarcity due to floods. In this connection the growth of lucerne and maize should be encouraged with the view of providing reserve food supplies on the homestead in the form of both hay and ensilage. The various operations in the growing of the crops and the making of hay were referred to in turn, yet it seemed strange that such large quantities of hay and chaff should be imported into a rich agricultural district in dry times. In connection with the making of ensilage the lecturer explained the various stages from the growing of the crops to the making and feeding of the ensilage to stock. He explained that ensilage could be made in several ways, viz., in the stack, pit, or tub.

Great interest was taken in the proceedings by the members present, and at the conclusion of the lecture a large number of questions were asked and answered regarding various matters connected with the growing of crops, best varieties to plant, time of harvesting, and the building of the stack, or filling of a tub.

At the conclusion of the meeting the usual vote of thanks was accorded the lecturer.

Walli.

This branch held its annual picnic and social on 11th March, under ideal weather conditions. The attendance was large at both functions, which proved very enjoyable.

Wollun.

At last meeting of this branch, held on 28th February, Mr. J. McInnes read a paper on bird and insect life, which was greatly appreciated. Considerations of space necessitate the postponement of publishing the report till our next issue.

Orchard Notes.

W. J. ALLEN.

MAY.

Prepare for Planting and Pruning.

THE preparation of land for planting out deciduous fruit trees should be pushed ahead this month, as the trees should be planted out in June if possible. The area to be laid out should be cleared, well fenced, and worked to an even depth. It is always advisable to ascertain the varieties of fruits which find most favour on the markets, then select such kinds as will thrive best in the soil and climate. There is a shortage of approved commercial varieties obtainable from nurserymen this season so that the necessity for ordering the trees at once is apparent. It is essential that the orchard be laid out properly, giving the trees plenty of room, so that there will be a sufficient area from which they will draw moisture to keep them in good growing condition during dry seasons.

Refills.

For the purpose of preparing holes for refills amongst old trees, the soil should be removed, and new loamy soil should replace that taken away. It is rather difficult to make young trees start in places where old trees have failed for one cause or another. The addition of a small dressing of lime is beneficial in the sour spots which are occasionally found in our orchards.

Passion Fruit.

Keep the fruit picked regularly. Grade it nicely, and pack it in rows in the boxes. If growers are exporting any other fruit, it would be a good plan to send a few cases of passion fruit along in order to test their carrying quality, as, if we can successfully land this fruit on the markets of the Old World and get it well introduced there, there should be an unlimited demand for it. There are thousands of acres of land near the coast on which the plant does well, and where, with proper attention, it produces heavy crops of fruit annually. Unfortunately, the trial shipments we have made up to the present have not all turned out satisfactorily, but we hope in time that the difficulties may be overcome, and that we may yet create a demand for this delicious fruit.

At the Experiment Farm, Bomen, the Orchardist, Mr. S. A. Hogg, processed some sample tins of passion fruit pulp this season. These have been forwarded to the Agent-General in London, with a view to ascertaining the trade possibilities in this direction.

Harvesting.

Lemons and mandarins will soon be ready for picking. Nothing but clean, well-graded, bright-coloured fruit should be forwarded to market.

Pruning.

This work may be commenced any time now. Peaches, apricots, and Japanese plums should be treated first.

Weak Trees.

Attention should be given to any weak trees. The addition of a heavy dressing of stable manure or new soil will do the trees an immense amount of good. When pruning weak trees, a good heavy cutting back will induce a vigorous young growth.

Nursery Stock.

The wraps on all budded nursery stock may be removed at any time now.

Wire-netting the Orchard.

Wherever it is necessary to enclose the orchard with wire-netting—and I am sorry to say that this is a precaution which cannot be overlooked in many parts of the State—it is best to use a good wide netting, with small mesh at the bottom, as it is wonderful through what a small mesh a young rabbit will get, as well as how high a fence he will scale. Therefore, if the orchardist wishes to preserve his trees from the attacks of these pests, he must see that the orchard is securely enclosed

Fruit Fly.

Be very particular to pick up all fallen and infected fruit. Kerosene traps are excellent means for catching the fly. Shallow tins are preferable to deep ones. Saucers may be used if tins are not available.

Improvements.

If such a thing as a slack time occurs in an orchard it is likely to occur this month. At the same time there are the drains, fences, and gates, or any other repairs that might be seen to, for as soon as pruning commences other work must wait.

Early Occurrence of Irish Blight in Tasmania.

Mr. McAlpine, in his book on Potato Diseases, quotes Joseph Phipps Townsend as saying in his "Rambles and Observations in New South Wales," dated October, 1848, "Very fine black potatoes are grown on the coast, but I observed in local papers that the potato disease made its appearance in the colony in August, 1846," that is, a year after the terrible epidemic in Ireland.

It appears that the disease made its appearance very early in Tasmania also, for in an article by Dr. John Day, of Geelong, in the *Australian Medical Journal* of 1868, to which Dr. Cleland has drawn my attention, the author says, "Diphtheria first appeared in Melbourne in 1858, almost simultaneously with its appearance in Europe and America," and adds, "the potato disease, I believe I am correct in saying, appeared almost simultaneously in Ireland and in Tasmania also."—G. P. Darnell-Smith.

Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull.	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn	Imperialist ...	Florio	Lady Nancy of Minembah.	Berry Farm ...	*
" ..	The Irishman (imp.)	Tipperary Bull	Colleen Bawn (imp.)	Berry Farm	†
Jersey ...	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Yanco Farm	*
" ...	Trafalgar ..	Best Man ...	Rum Omelette	Cowra Farm ...	*
" ...	Kaid of Khartoum	Sir Jack ...	Egyptian Belle	H. A. College .	*
" ...	Bridegroom .	Best Man	Golden Omelette.	Yanco Farm ..	*
" ..	Leda's Retford Pride.	Dinah's Lad	Leda's Angel..	Wagga Farm ..	*
Guernsey ..	The King's Mirror	Calm Prince ..	Vivid (imp.)	Kyogle .. .	4 July, '14.
" ...	Star Prince ..	Calm Prince .	Vivid (imp.)	Casino	-- Sept., '14.
" ...	Sky Pilot ...	Prince Souvia	Parson's Red Rose (imp.)	Maclean	11 July, '14.
" ...	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (6509	Inverell	5 Oct., '14.
" ...	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	*
" ...	Claudius (imp.)	Golden Star II.	Claudia's Pride (imp.).	Wollongbar Farm	†
" ...	Trengwainton Village Favourite (imp.)	Trengwainton Village Lad	Wild Eyes ..	Wollongbar Farm	*
" ...	George III ...	King of the Roses.	Calm 2nd ...	Mullumbimby .	31 Mar., '15.
" ...	The Peacemaker	Calm Prince .	Rose Petersen	Scone	2 July, '14.
" ...	King of the Roses	Hayes' King	Rosey 8th (im.)	Bega .. .	20 June, '14.
" ...	Lauderlad ...	Laura's Boy .	Souvenir of Wollongbar	Casino	-- Sept., '14.
" ...	Belfast	King of the Roses	Flaxy 2nd ...	Grafton Farm ...	†
" ..	Royal Preel ..	Itchen Royal .	Hayes' Lily du Preel (imp.)	Wollongbar Farm	
" ...	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Fredericton ...	-- Sept., '14.
" ...	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	Paterson-Vacy ..	9 Sept., '14.
Ayrshire ...	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose	Grafton Farm	*
" ...	Orphan Boy ..	Songster of Greystanes	Rosamond ..	Glen Innes Farm..	*
" ...	Wyllieland Bright Lad (imp.)	Wyllieland Glenifer (7229)	Wyllieland Sangie	H. A. College, Richmond	*
" ...	Isabel's Majestic	Majestic of Oakbank.	Isabel of Gleneira.	Grafton Farm ...	*
Kerry...	Rising Sun ...	Bratha's Boy ..	Dawn ..	Bathurst Farm ..	*

*Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed.

Department of Agriculture,
Sydney, 2nd May, 1914.

BULLS FOR SALE

AT BERRY EXPERIMENT FARM.

HOLSTEIN.—Colonel Neitenstein (355): date of birth, 26th April, 1912; colour, black and white; sire, Neitenstein, by Hollander; dam, Marjorie, by Chairman; g d Margaretha (imp.), 10,439; dam of sire, Dutch Oven by President. Price, **£15.**

Milk yields of dams :—	Milk lb.	Fat per cent.	Butter lb.
Marjorie	5,030	...	224
Margaretha (imp.)	10,990	...	407
Dutch Oven	8,671	3·6	365

IRISH SHORTHORN.—Irish Boy (577): date of birth, 9th April, 1912; colour, rich roan; sire, Limerick's Lad (imp.); dam, Colleen Bawn (imp.).

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Colleen Bawn	6,937	3·8	309

MILKING SHORTHORN.—Johnny Walker (596): date of birth, 3rd February, 1913; colour, deep red, little white; sire, Imperialist (MS); dam, Royal Dew, by Royal Hampton (imp.); g d Dewdrop, by Dora's Boy; g g d Lady Fanny, by Lord Sangrave (imp.); g g g d Fanny 78th (imp.); dam of sire, Lady Nancy of Minembah (357). Price, **20 guineas.**

GUERNSEYS.—Mountain Prince (593): date of birth, 12th January, 1913; colour, lemon and white; sire, Calm Prince; dam, Angelica 8th (imp.). Price, **30 guineas.**

Rohais' Lad (601): date of birth, 18th March, 1913; colour, lemon and white; sire, Calm Prince; dam, Rohais' Lassie (imp.). Price, **40 guineas.**

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Rohais' Lassie...	5,537	5.1	333

Othello (605): date of birth, 4th April, 1913; colour, lemon and white; sire, Trengwainton Village Favourite (imp.); dam, Desdemona 8th (imp.). Price, **35 guineas.**

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb
Desdemona 8th (imp) ...	6,721	4·3	340

JERSEYS.—Golden Fox (586): date of birth, 7th December, 1912; colour, whole fawn; sire, Xmas Fox (imp.); dam, Golden Omelette, by Sir Jack; g d Rum Omelette 2nd, by Golden Lord; dam of sire, Malvoisie (vol. xx, p. 369) by Gay Boy, 7510. Price, **15 guineas.**

Milk yield of dams :—	Milk lb.	Fat per cent.	Butter lb.
Golden Omelette	3,064	5·6	202(in 28 weeks)
Rum Omelette 2nd...	5,667	4·4	361

Dancing Fox (552): date of birth, 1st June, 1912; colour, whole fawn; sire, Xmas Fox (imp.); dam, Lady Gay, by Sir Jack; g d, Rum Omelette II, by Golden Lord; g g d, Rum Omelette (imp.). Price, **15 guineas.**

AT GLEN INNES EXPERIMENT FARM.

AYRSHIRES.—The Poet: date of birth, 17th February, 1912; sire, Byron; dam, Scotch Heather, by Jamie's Ayr; g d, Leaf Bud, by Prince Emerald (imp.); g g d, Rose Berry, by Mischief Maker of Barcheskie (imp.), 3,892. Price, **£10.**

Milk yield of dams :—	Milk lb.	Fat per cent.	Butter lb
Scotch Heather (first calf)	4,345	3·9	203
Leaf Bud	8,389	3·4	333

Orphan Boy: bred by A. H. Woods, Inverell; date of birth, 19th November, 1909; colour, dark brown and white; sire, Songster of Greystanes; dam, Rosemond, by Lucre of Oakbank; g d, Roseleaf 2nd of Glen Elgin, by Glen Elgin's Prince. Orphan Boy won 1st prize, Inverell, and champion prize, Glen Innes Shows, in 1912. Price, **25 guineas.**

BULLS FOR SALE—*continued.*

AT HAWKESBURY AGRICULTURAL COLLEGE.

AYRSHIRE.—The Corsair (483): date of birth, 6th May, 1911; colour, red and white; sire, Byron, by Auchenbrain Spicy Jock (imp.); dam, Ripple Rose, by Prince Emerald (imp.); g d, Rose Berry, by Mischief Maker of Barcheskie (imp.), 3,892; dam of sire, Julia, by Peacemaker. Price, **15 guineas.**

Milk yields of dams :—	Milk lb.	Fat per cent.	Butter lb.
Ripple Rose	7,669	3·9	351
Rose Berry	5,799	4·1	280

AT GRAFTON EXPERIMENT FARM.

GUERNSEY.—Storm Prince (2): date of birth, 18th October, 1912; colour, lemon and white; sire, Calm Prince; dam, Angelica of Richmond, by Governor of Conture (826 P.S.); g dam, Angelica 8th (imp). Price, **25 guineas.**

AT WOLLONGBAR EXPERIMENT FARM.

GUERNSEY.—Royal Preel (imp): date of birth, 25th May, 1908; sire, Itchen Royal (1,756); dam, Hayes' Lily Du Preel 4th (imp.), 6,903; E.S H.B. Price, **45 guineas.**

GEORGE VALDER, Under Secretary, and
Director of Agriculture.

WINTER SCHOOL FOR FARMERS.

HAWKESBURY AGRICULTURAL COLLEGE.

ARRANGEMENTS have been made for the 1914 Winter School for farmers to commence at the Hawkesbury Agricultural College on Tuesday, 24th June, and to continue till Saturday, 19th July. The course embraces a variety of subjects—Agriculture, Dairying, Live Stock, Agricultural Chemistry, Bookkeeping, Elementary Surveying, Building Construction, Poultry Farming, Engineering and Blacksmithing, Saddlery, Gardening, Fencing, Veterinary Science, Irrigation, Drainage, Implements and Machinery, Fodder Conservation, Sheep and Wool, etc.

The course is open to farmers and graziers, their sons, or other agricultural workers who have worked at least one year on the land and are over 16 years of age.

Applications for entrance are to be forwarded to the Under Secretary, Department of Agriculture, Sydney, not later than the 31st May.

Reduced rates will be allowed students travelling over 25 miles by rail, and the tickets will be of six weeks' duration. Students travelling by the North Coast Steam Navigation Company's boats will be allowed a rebate of 10 per cent. off the cost of their saloon return tickets.

The fee for the course is £2 2s., which includes board and lodging at the College.

The syllabus of the course and a copy of the conditions of entrance can be obtained from the Department of Agriculture.

AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1914.

Society.	Secretary.	Date.
Dubbo P., A., and H. Association	F. Weston	May 5, 6
Dungog A. and H. Association	C. E. Grant	,, 6, 7
Port Macquarie & Hastings Dist. A. and H. Society	T. Dick	,, 6, 7
Clarence P. and A. Society (Grafton)	G. N. Small	,, 6, 7, 8
Hawkesbury District A. Association (Windsor)	H. S. Johnston	,, 7, 8, 9
Lower Clarence A. Society (Maclean)	J. McPherson	,, 12, 13
Warialda P. and A. Association	C. J. Devine	,, 12, 13, 14
Coonamble P. and A. Association	J. C. Wilson	,, 13, 14
Gloucester A., H., and P. Association	G. E. Furness	,, 20, 21
Trangie P., A., and H. Association	A. K. Butter	,, 20, 21
Walgett P. and A. Association	W. Neal	,, 27, 28
N.S.W. Sheepbreeders' Association (Sydney)	H. N. Bowden	July 1, 2, 3, 4
Deniliquin P. and A. Society	L. Harrison	,, 16, 17
Narandera P. and A. Association	W. T. Lynch	Aug. 4, 5
Corowa P., A., and H. Society	John D. Fraser	,, 18, 19
Murrumbidgee P. and A. Association (Wagga Wagga)	A. F. D. White	,, 25, 26, 27
Parkes P., A., and H. Association	G. W. Seaton	,, 26, 27
Wellington P., A., and H. Society	A. E. Rotton	Sept. 1, 2
Grenfell P., A., and H. Association	G. Cousins	,, 1, 2
Gunnedah P., A., and H. Association	M. C. Tweedie	,, 1, 2, 3
Manildra P. and A. Association	A. Anderson	,, 2
Germanton P., A., and H. Society	Jas. S. Stewart	,, 2, 3
Albury and Border P., A., and H. Society	W. I. Johnson	,, 8, 9, 10
Ganmain A. and P. Association	J. F. Ashwood	,, 15, 16
Cootamundra A., P., H., and I. Association	T. Williams	,, 15, 16
Cowra P., A., and H. Association	E. W. Warren	,, 16, 17
Murrumburrah P., A., and I. Association	J. A. Foley	,, 22, 23
Temora P., A., H., and I. Association	J. Clark	,, 22, 23, 24
Riverina P. and A. Society (Jerilderie)	J. Kennedy	,, 23
Canowindra P., A., and H. Association	G. Newman	,, 23, 24
Yass P. and A. Association	W. Thomson	,, 30, Oct. 1
Hay P. and A. Association	G. S. Camden	Oct. 6, 7
Hillston P. and A. Society	S. J. Gordon	,, 7
Tweed River Agricultural Society	A. E. Budd	Nov. 11, 12
Lismore A. and I. Society	T. M. Hewitt	,, 25, 26, 27

1915.

Albion Park A., H., and I. Association	M. A. Brown	Jan. 20, 21
Kiama A. Association	G. A. Somerville	,, 26, 27
Shoalhaven A. and H. Association	H. Rauch	Feb. 10, 11
Newcastle A., H., and I. Association	E. J. Dann	,, 10, 11, 12, 13.
Guyra P., A., and H. Association	P. N. Stevenson	,, 23, 24, 25
Uralla A. Association	H. W. Vincent	Mar. 2, 3, 4
Tenterfield P., A., and M. Society	F. W. Hoskin	,, 2, 3, 4
Glen Innes & Central New England P. & A. Assoc'n	G. A. Priest	,, 9, 10, 11
Tumbarumba and Upper Murray P. and A. Society	E. W. Figures	,, 10, 11, 12
Inverell P. and A. Association	J. McIlveen	,, 17, 18, 19
Quirindi P., A., and H. Association	H. H. Rourke	,, 23, 24

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Agricultural Gazette of New South Wales.

Sheep and Wool for the Farmer.

CROSS-BREEDING EXPERIMENTS FOR 1910-11-12-13.

THE WOOL AND MUTTON TYPE.

[Continued from page 105.]

J. WRENFORD MATHEWS.

The Question of Food Supply.

As a contributing factor to the success of the experiments in cross breeding for wool and mutton, the question of food supply enters very largely into the commercial aspect of the undertaking. It was, therefore, of the greatest importance that a record of what was done in this direction should be taken.

The sheep were kept in accordance with the ordinary farm practice. They were considered as a factor in mixed farming, being used to turn to profitable account anything edible that might be grown or appear about the farm. Under average climatic conditions no artificial feeding was resorted to, except at Glen Innes, where at times it is necessary to hand-feed during the winter.

Except at Bathurst (where there is no natural pasture, thus necessitating feeding almost entirely on fodder crops), the sheep were grazed mainly on natural pastures. At Wagga and Cowra, however, this supply was augmented by the pickings afforded by the stubbles after harvest, and by what grew upon the areas temporarily out of cultivation. Fodder crops were also grown, but the success resulting from the planting of these was by no means uniform. In consequence of the diverse conditions under which the experiments are being carried out, a uniform system of feeding could not be conducted throughout. Care, however, has so far been taken to see that no one cross receives a greater food supply than another. The conditions under which the sheep have up to the present been raised are identical in each case.

For a more complete explanation of the methods employed, each farm will be dealt with individually.

WAGGA.

As already stated, feeding constitutes an important factor, and it will be necessary first to analyse the records from this point of view. This will necessitate giving some idea of the scope of the farm area, and ascertaining what portions were available for the sheep.

The Wagga Farm comprises an area of approximately 3,200 acres; but, as might be easily understood, all sections are not available for sheep, as the dairy herd, working and other horses, pigs and poultry have to be considered.

Besides the progressive increase from the sheep comprising the foundation-stock used in the experiments, there are also accommodated on the pastures several pure-bred flocks of British breeds,

The stud flocks comprise English Leicesters, South Downs, Shropshires, and Dorset Horns. At the present time they include, besides the rams that are kept for transfer to the other farms and sale to farmers, twenty-six English Leicesters, sixty-three Dorset Horns, twenty-nine Shropshires, and twelve South Down ewes.

It is generally conceded that it takes as much pasture again to raise a stud animal satisfactorily as it does a sheep intended for commercial purposes. As these, as well as the other classes of stock, were at times depastured on the same areas, these anomalies will require some little adjustment before the carrying capacity of the farm can be gauged with any degree of accuracy.

How the Sheep were Fed.

It is here necessary to distinguish between virgin pasture and the ordinary grazing paddocks, which latter comprise the areas that have previously been under cultivation. To determine the ultimate feeding value of the virgin pasture as compared with the grazing fields, these are taken separately, and the averages contrasted for the years mentioned.

Fodder crops were not grown to any appreciable extent, so that any records which might have resulted from this method of feeding do not enter very extensively into the calculations.

Inclusive of both natural pasture and what is here defined as ordinary grazing, the available portions comprised altogether 2,362 acres, of which 1,187 acres had been under cultivation and 1,175 were natural pasture.

Areas Previously Cultivated.

The food supply obtained from this source consisted solely of the stubble fields and the food that appeared subsequent to rain and prior to the ploughing in of the area. In addition, there was the area which was allowed to lie under "bare fallow," and which from time to time afforded a picking for the stock. The feed available on those areas may therefore be discussed under three distinct heads:—

(1) Stubble. (2) Ordinary Grazing. (3) Bare Fallow Feed.

With regard to these, it will be as well to adopt a definite line of demarcation.

The grazing value of each of the periods which these represent naturally varies according to the number of sheep placed on the area at any one time, and also, in the case of "Ordinary Grazing," according to the nature of the season. Nevertheless, if not intentionally eaten out, the stubbles usually afford a fairly good ration throughout the summer until the first rains which, when seasonable, usually fall here early in February. In regard to stubble feeding, it might here be pointed out that if this be supplemented by some other form of green feed, so much the better. Lucerne can be made available for this purpose in the district referred to at this time of the year. Where this is grown an occasional pick will not only help to keep the sheep in a healthy condition, but will also improve the feeding value of both the dry stubble and the lucerne. A judicious blending of the ration is always the more economical method of feeding.

After the rains, especially if they be at all heavy, the paddocks are of little value for feed from the stubble point of view. If, following the first downpour, the falls be frequent, a prompt and abundant growth is established. Unless occasioned by a hot spell, with its consequent withering effects, the growth then in evidence is ensured for the balance of the year. The feed thus appearing from this onward until the area is ploughed is termed "ordinary grazing."

The Value of Stubble, Ordinary Grazing, and Bare Fallow.

The ten cultivation paddocks used by the sheep have all been cropped with wheat, which is usually manured with superphosphate at the rate of 56 lb. per acre. Harvesting usually commences about the middle of November, and seldom continues for more than a month. The crops are invariably harvested with the reaper and binder, consequently the stubbles are short.

The following table shows the carrying capacity of the various cultivation paddocks; but it should be borne in mind that, owing to the number of breeds and crosses kept, there has been more movement from one paddock to another throughout the various years than would be necessary on an ordinary farm. In other words, more care was taken to ensure the complete separation of the various small flocks at certain seasons of the year than to consider the carrying capacity of the paddocks.

Field No. 1 of 90 acres carried half its area under rape in 1910. The crop was sown in March, and the sheep were first placed on it in August. Between the 2nd of that month and the 18th of September it fed 208 sheep, or at the rate of nearly five sheep per acre for that period. The sheep were only left on the crop during the day, being removed to an eaten-out cultivation paddock each evening, where they remained overnight.

TABLE showing feeding value of cultivation paddocks at Wagga Experiment Farm for 1910–13.

Paddock.	Area.	Sheep per Acre.				
		1910.	1911.	1912.	1913.	Approximate Average.
No.	Acres.					
3*a*	88	·28*ab*	·17*b*	·06*a*	·50*ac*	·26
2	144	·12*ab*	......	·15*a*	·16*ac*	·14
1	90	·72*d*	·29*abc*	·09*a*	·13*ab*	·31
4	90	·13*ac*	·31*c*	·09*c*	·08*a*	·15
6	72	·24*abc*	·05*b*	·37**ac*	·08*a*	·18
5	154	·15*a*	·18*ac*	·47	·27*a*	·27
5*a*	145	·17*b*	·14*ac*	·08*c*	16*ac*	·14
8	28	·41*ac*	·47*abc*	·07*c*	·37*ac*	·33
3	93	......	·20*a*	·28*ac*	·06*c*	·18
7	38	·12*a*	·31*ac*	·22*ab*	·07*b*	·18
4*a*	121	......	......	·07*a*	·16*ac*	·12

* In this paddock hand-feeding had to be resorted to for nearly three months.

(*a*) Stubble, (*b*) Bare fallow, (c) Ordinary grazing, (*d*) Rape. Approximate average for 4 years = ·2 sheep per acre or 1 acre to 5 sheep.

Lucerne.

The two paddocks under this crop have been utilized for sheep-grazing during the years under review. It has been reserved mostly for the wethers intended for exhibition, and for some of the stud sheep. The growth is dependent entirely on the natural rainfall. During the winter the native grasses are rather more in evidence in these paddocks than the lucerne itself.

TABLE showing carrying capacity of Un-irrigated Lucerne.
Wagga Experiment Farm, 1910–13.

Paddock.	Area.	Sheep per Acre.				
		1910.	1911.	1912.	1913.	Approximate Averages.
No.	Acres.					
56	113	......	·55*	·57	·26*	·46
2	11	·66	1·33	·28	·77	·76

* This was in addition to a cut of lucerne taken off in these two years.

Areas under Natural Pasture.

It may now be well to take the records which have been furnished for the natural pasture, of which 1,175 acres are exclusively devoted to sheep.

Sheep, especially cross-breds, raised at this farm, have always been noted not only for the quality and sweetness of their mutton, but also for their comparative heavy weight of carcase. What surprised many (particularly some of our New Zealand friends) on inspecting the carcases which have from time to time been exhibited at the sheep shows in Sydney and forwarded from this farm, was the consistently high dressed-weight recorded for the different crosses, as compared with the live sheep seen in the pens. While this is largely the result of never over-stocking, the more potent factor lies undoubtedly in the quality of the pasture on which they were raised.

Riverina is certainly favoured in the assortment and quality of its native grasses, and whilst some localities might not be as well off as others in this respect, on the pastures at the Wagga Farm there are to be found most of the best kinds that have become established throughout the district. As they have a high nutritive ratio, stock fatten on them with a firmness of flesh, which is perhaps not so characteristic of the pastures of other districts, though the growth might be more succulent. Mainly attributable to the nature of their blend, what still adds appreciably to their value is the variation in the period of the year during which certain kinds appear.

A Classification of the Pastures.

Mr. E. Breakwell, B.A., B.Sc., Agrostologist to the Department, who has been asked to co-operate, has made a classification of the grasses growing on the Wagga Farm, and furnishes some valuable data in this connection. He states :—

"There are no cultivated pastures worth mentioning in the Wagga district. Stock rely for the most part on the natural herbage, together with

other introduced plants which have become acclimatised and now occupy a big portion of the pastures. During the winter and spring months the bulk of the feed is provided by the following plants:—

Hordeum murinum (Barley Grass).
Festuca myurus (Rat's Tail Fescue).
Danthonia pilosa (Wallaby Grass).
Poa coespitosa (Native Poa).
Bromus unioloides (Prairie Grass).
Medicago denticulata (Burr Trefoil).
Medicago minima (another Burr Trefoil).
Erodium cygnorum
Erodium cicutarium (Crowfoot).
Erodium mosebatum
Cryptostemma calendulacea (Cape weed).

Barley Grass is an introduced grass which has made good right throughout the State. In Wagga, given good autumn rains, it will crowd out other herbage and take undisputed possession of the pastures. The grass provides a great bulk of feed in the winter months, when other vegetation is dormant. It has two striking disadvantages, viz., its short-lived habit, and its particularly sharp seeds. The season for barley grass in Wagga may be reckoned from June to October, after which time it is dry and most innutritious. It is a difficult matter to prevent the grass from seeding once established, and the sharp seeds are a constant source of annoyance and injury to the mouth and eyes of stock.

Rat's Tail Fescue does not provide the same amount of flag as barley grass; but, like the latter, it is a valuable adjunct to the winter pastures. The grass seeds about the same time as barley grass.

Danthonia pilosa (a native grass), which grows in tufts, lasts practically all through the year. Although a small grass, its abundance enables it to stand heavier stocking than most grasses. The white fluffy seeds are easily disseminated by the winds.

Poa coespitosa (Australian or Native Poa).—This is a wiry grass growing in tall clumps on both poor and good soils. It is eaten only when young. Its seed heads are of a bluish colour, and can be seen in the summer months.

Bromus unioloides (Prairie Grass).—An annual introduced grass of great value. It may be considered, however, a practically negligible quantity in uncultivated pastures, as stock will not give it a chance to assert itself, nor will it stand much stocking.

Medicago denticulata (Burr Trefoil) is a well-known introduced plant. It provides plenty of feed in a good season, and is a great favourite with sheep. Its burrs are likely to be a nuisance.

Medicago minima.—This is a heavier plant than the preceding one assuming a more prostrate habit. It is readily eaten by sheep.

Of the Crowfoot varieties *Erodium cygnorum* is the native Crowfoot. This is not so abundant in Wagga as the introduced varieties of Crowfoot (*cicutarium* and *mosebatum*). The two first-named, and to a less extent the last-named, provide good succulent feed in the winter and spring months. *Erodium cicutarium* as a rule is of a somewhat prostrate character.

Cryptostemma calendulacea (Cape Weed).—Although this plant is eaten by sheep, it must be considered a poor plant to have in pastures. It occupies the ground to the exclusion of better plants, and is a bad weed in cultivated lands.

Grasses in Summer and Autumn.

Generally speaking, no introduced grasses occur in the summer pastures at Wagga. This is undoubtedly due to the hot dry season, Wagga, of course, falling in the winter zône rain area.

The summer pastures, however, are good ones, consisting mostly of *Danthonia pilosa, Danthonia semiannularis, Stipa scabra, Aristida behriana, Andropogon pertusus*, and to a less extent *Andropogon sericeus, Panicum effusum, Panicum divaricatissimum* and *Panicum gracile.*

Danthonia semiannularis is very similar to *Danthonia pilosa*, but is usually not so hairy. It is a splendid grass from every point of view.

Stipa scabra (Corkscrew or Spear Grass).—This grass provides feed in its young stages, but is very obnoxious when in seed.

Aristida behriana (a Spear Grass).—This is another grass which is eaten when young. When mature, however, its large bushy head of sharp seeds renders it undesirable.

Andropogon pertusus (Pitted Blue Grass).—Under favourable conditions this grass produces a fine sward and will stand a fair amount of stocking. It is well liked by sheep.

Andropogon sericeus (Queensland Blue Grass).—Unfortunately this fine grass disappears under heavy stocking. It must be considered one of our best native grasses.

The Panic Grasses, including *Panicum effusum, Panicum divaricatissimum* (Umbrella Grass), and *Panicum gracile*, are noteworthy for being most palatable and drought-resisting. Their palatability is evidenced by the fact that they tend to disappear when the pastures are stocked a little heavily. Very few of these fine grasses are now found on the Wagga pastures.

Generally speaking, the Wagga pastures may be considered as carrying plenty of feed right throughout the year. In the cooler months herbage and introduced grasses prevail, while in the hotter season tussocky grasses with very little herbage are the rule. Under moderate stocking, or by resting the paddocks, these grasses would be allowed to seed, thus perpetuating the pastures. Only by this means can the native grasses be expected to maintain their present carrying capacity."

Carrying Capacity of the Wagga Natural Pastures.

A fair idea of the number of sheep carried by each of the paddocks during the four years under review may be gathered from the following summary:—

TABLE showing carrying capacity of natural pastures, Wagga Experiment Farm, 1910–13.

Paddock.	Area.	Sheep per Acre.				
		1910.	1911.	1912.	1913.	Approximate Average.
No.	Acres.					
1	270	·91	·41	·42*	·33	·52
2	162	1·31	·49	·70*	·49	·75
2a	210	1·06	·50	·67*	·61	·71
4a	164	·87	·30	·75*	·38	·57
4b	157	·76	·40	·35	·56	·52
Ram paddock	79	·32	·37	·60	·38	·42
4c	121	·47	·59	—	—	·53
12	12	·08	·32	·18	·31	·22

* In these paddocks hand feeding had to be resorted to for about three months.

The approximate average over the whole 1,175 acres is ·58 sheep per acre, or about three sheep to 5 acres.

Seasons.

The average rainfall recorded at the Wagga Farm prior to and inclusive of 1910 is 17·62 inches, while the falls and the extent of their distribution from the year during which the experiments were put into operation may be gathered from the following table:—

Month.	1910.	1911.	1912.	1913.
	Points.	Points.	Points.	Points.
January	345	381	15	77
February	Nil.	362	55	143
March	129	253	4	387
April	Nil.	Nil.	25	7
May	83	262	2	250
June	390	257	171	122
July	215	203	309	70
August	62	50	216	99
September	187	271	158	176
October	213	26	121	195
November	135	242	163	48
December	104	166	170	71
Total inches	18·63	24·73	14·09	16·45

Prevailing Conditions.

On reviewing these records it will be observed that the first two years show a better rainfall than the average, while the year 1912 is very much below the average.

The most favourable seasons for stock, however, cannot altogether be reckoned on the bountifulness of the rainfall. The extent of its distribution, and the particular periods of the year during which it falls, play, perhaps, a more important part in deciding between what may be considered a favourable and a somewhat indifferent year. Taking the period above as an instance, the records furnished for 1911 form a good illustration of this. Throughout this year 2,473 points were recorded, of which 15 inches fell during the first half. Nearly eight inches of this latter were recorded the first two months, clearly indicating that there was a drying-off and a shortage of moisture subsequently, when it was evidently mostly needed, as is frequently the case when the falls occur out of season and are abnormally heavy. Indeed, it is doubtful whether as much benefit was derived from the heavy falls recorded for 1911 as resulted from the lower averages but more equal distribution of 1910 and 1913 respectively.

Hand-feeding.

The shortage of rainfall in 1912 made hand-feeding necessary, but it was not resorted to till the 1st May. Up to this time the sheep had been maintained fairly satisfactorily on what was available from 1911, which consisted principally of stubble.

A month prior to hand-feeding being undertaken the sheep were reduced to very low rations, as it was daily expected that timely rain would relieve the intensity of the situation. This form of feeding was therefore delayed longer than it otherwise would have been. By this time, however, the ewes were due shortly to lamb, and to defer matters meant that a considerable number would become so weakened in their condition as to risk the rearing of the lambs. Besides this, further delay might have proved fatal to the experiments which, by this time, had entered upon their third year.

Methods Adopted.

The trials were instituted under several different methods of feeding, and, in order to carry these into effect, the sheep were classified into three separate flocks, namely :—The British breeds, cross-breds and merinos.

To the Dorset Horns, which numbered 27 and were rearing lambs, was given an allowance of about 1 lb. "Beeswing" chaff, together with 2 ounces of dry grain per head per day. They also had the pickings of an old lucerne paddock, upon which, as might be understood during a season like this, there was but a scanty growth.

The other British bred ewes, namely, Shropshires, South Downs and English Leicesters, were supplied with 1 lb. of hay chaff, 1½ lb. pie melon, and 1 lb. silage per day. They also had the run of an old stubble paddock, which, however, was pretty well exhausted from previous feedings.

The second ration was prepared on the cheapest possible basis consistent with a fair blending of the food constituents. It consisted of 3½ lb. "cocky" chaff, and 2 ounces second-class wheat. In order to provide a substitute for green feed, in addition there was fed 2½ lb. pie melon per head per day. The

sheep also had the pickings of a straw stack. Besides this, the flock in question received an allowance of one pound of silage per day. The melons were greatly relished by the sheep, and in addition kept the internal system regular, thus obviating any occurrence of impaction.

The third method of feeding was conducted with the cross-bred ewes which were rearing lambs. Here the daily allowance consisted of $3\frac{3}{4}$ lb. silage and about $\frac{3}{4}$ lb. of hay chaff per diem.

The dry sheep, first-cross ewe hoggets for mating during the next year, all tests of first and second crosses up to four-tooths, and stud ewe hoggets were given 2 lb. silage, and about $\frac{1}{2}$ lb. second quality hay chaff per head per day. These naturally did not require as much food as ewes rearing lambs.

The foregoing represents the proportions given during the later stages of the drought. During the earlier periods, before the position had become so severe, only ensilage was fed to the sheep. This was fed mainly to ewes then expected to lamb. On hand was a supply of several hundred tons of this, which had been stored during the years of plenty. Though in the pits for several years, it opened up quite succulent and palatable, and was readily eaten by the sheep. The ensilage consisted of the first cut of a lucerne paddock of about one-half barley grass, while the balance comprised lucerne and other herbage, chiefly trefoil. It was cut when the barley grass was green and in ear. The only objection to this, however, was that if not readily eaten by the sheep, and left exposed, the heads of the barley grass turned dry, and the awns were just as objectionable as when the grass is fresh. When not served in combination with other fodders the allowance was $6\frac{1}{2}$ lb. per day per sheep.

Though some of the ewes were somewhat low in condition at the time of lambing, still on this food they remained vigorous, and continued to rear their lambs.

The deaths recorded during the period total fourteen ewes. The majority of these were the result of natural causes. In only one case could death be directly attributable to lambing when in poor condition.

Before the ewes started to lamb they were given a lick consisting of Liverpool salt, with 6 per cent. of Epsom salts added. It is believed that this assisted the flow of milk, apart from the special value which it had in checking the tendency to impaction in the absence of succulent pasture.

It is asserted that, in other dry years when the lick was not provided, it was quite common to find at least 15 per cent. of the ewes lambing without milk at all. This necessitated the destruction of the lamb, as there was little chance of obtaining another ewe to mother it in such a season.

During the year in question all the ewes lambed with a fair show of milk, though, with the pastures bare, it meant a severe tax upon their system to maintain the supply.

The Suitability of Australian Hard Wheats for Macaroni.

In May, 1912, 11 lb. of each of the following seed wheats, viz., Saragolla Nos. 1, 2, and 3, Cretan, Medeah, and Kubanka, were forwarded to Dr. N. Strampelli, Director of the R. Stazione Sperimentale de Granicoltura, Rieti, Italy, with a view to their being made into macaroni, and the submission of a report as to their suitability for this purpose. The report is as follows:—

After having milled the grain, we passed the various products of the milling through a No. 120-silk sieve (that is, with a texture of 0·15 mm.), and we submitted the flour obtained to analysis for the determination of total nitrogen, of protein, of gluten, of starch, and of cellulose, and the results we have compiled in the annexed table.

It follows from these data that your hard wheats are very rich in total nitrogen, in protein, and in gluten—hence they are excellent for the preparation of macaroni flours.

With the same flour we have prepared macaroni, and have despatched to you in a case, 1 kilo (2¼ lb.) of each variety.

The macaronis obtained are excellent; they have only the defect of breaking too easily, and this is through the over-richness of gluten. Of course, this is not really any detriment, since it can be remedied by the addition of a certain proportion of soft flour.

Table showing analyses of the Flours sieved (No. 120-silk), from Australian wheats.

Variety.	Moisture.	Total nitrogen.	Crude protein.	Gluten.		Starch.	Fibre.
				Moist.	Dry.		
Saragolla 1 ...	12·16	2·485	15·53	49·970	18·10	60·78	0·55
,, 2 ...	11·61	2·630	16·43	49·560	17·79	60·97	0·40
,, 3 ...	12·28	2·390	14·93	49·690	17·70	61·36	0·34
Cretan	11·90	2·310	14·43	51·606	16·69	60·07	0·46
Medeah	12·70	2·500	15·62	53·340	17·66	61·70	0·30
Kubanka ...	12·58	2·450	15·31	53·420	17·16	62·14	0·40

Dr. Strampelli, in a supplementary report, states that the analytical data and the results obtained in these experiments in macaroni-making conclusively show that Australian hard wheats are among the best for the preparation of flour and semolina for macaroni-making. In his opinion the Saragollas were the best for this purpose; next comes the Medeah, then the Kubanka, and the last is Cretan.

The wheats forwarded were grown at the Wagga Experiment Farm.

Useful Australian Plants.

J. H. MAIDEN,
Government Botanist of New South Wales, and Director of the Botanic Gardens, Sydney.

No. 108.—Two species of *Lepturus* or Hard Grass.

Description of the genus *Lepturus* (B.Fl. vii, 667).

Spikelets one-flowered, or in a species not Australian two-flowered, sessile, and half embedded in the alternate notches of a more or less articulate simple spike.

Outer empty glumes two, one slightly overlapping the other on one side; or one only, appressed and covering the cavity, rigid and nerved.

Flowering glume and palea shorter, thin, and hyaline, embedded in the cavity, the axis of the spikelet produced behind the palea into a minute point, or bearing a small terminal empty glume.

Styles short.

Grain free from the glume.

Annuals.—Outer glumes with about five prominent nerves. Axis of the spikelet produced into a minute point or bristle.

Outer glumes of the lateral spikelets two . . . . . . 1. *L. incurvatus.*

Outer glume of the lateral spikelets only one. . . . 2. *L. cylindricus.*

The number of the outer glumes (two or one), which can be readily indicated by pressure between the finger and thumb, and the habit of the grass (curly in *incurvatus* and more erect in *cylindricus*) afford ready distinctions between the two species.

1. Curly Hard Grass (*Lepturus incurvatus*, Trin.).

Botanical name.—*Lepturus*, Greek; *leptos*, slender; *oura*, a tail, in allusion to the rhachis being continued into a point; *incurvatus*, Latin, crooked or bowed, in allusion to the flowering spikes.

Botanical description.—(B.Fl. vii, 668). A tufted or branching annual of 3 inches to 1 foot, or rarely more, slender in the Australian specimens with very narrow leaves.

Spikes nearly cylindrical, slender, 2 to 6 inches long, straight or curved.

Outer glumes two, rigid, acute, usually five-nerved, about 3 lines long, placed in the lateral spikelets apparently side by side outside the rest of the spikelet, but one slightly overlapping the other at the base.

Flowering glume and flower embedded in the cavity of the *rhachis* of the spike, the *rhachis* of the spikelet slightly produced behind the palea into a minute point sometimes almost obsolete. In the terminal spikelet the two outer glumes are normally exposed to each other.

Value as a fodder.—The references in literature to the fodder-value of the various *Lepturus* grasses are exceedingly rare. The inference is that either not much is known of them in this direction, or that they are not esteemed. The report of a valued correspondent (Mr. Thomas Grieve, of Moulamein,) is, therefore, of special interest, and may lead to further inquiry :—

There is no grass about here of which stock are fonder, especially horses. Very scarce about here, most likely for the reason that stock do not give it a chance to grow.

Habitat and range.—Found in salt marshes in the coast districts of New South Wales south from the Hawkesbury to Victoria, and also in the interior. Specific localities are Woy Woy (near Gosford), Centennial Park and Kogarah (Sydney), Nyngan (400 miles west of Sydney), Wanganella, *via* Hay, Moulamein (on the Edwards River, a tributary of the Murray).

The Flora Australiensis quotes "salt marshes, Parramatta." Search will greatly extend the recorded range.

It has also been recorded from Victoria and South Australia.

It is also in New Zealand (introduced), India, Britain, the Mediterranean, and the United States.

The fact is sometimes lost sight of that when a plant requires brackish conditions these can be obtained other than near the coast. Distinctly removed from sea-water, be it only 5 miles, or as distant as hundreds of miles, there are swamps (sometimes dry, perhaps), the water in which is normally brackish, or it is only observed to be brackish when concentrated by a drought.

These grasses are instances in point. They grow either in the coast districts or in the Western Plains, because these areas afford saline conditions.

Mr. Lamson Scribner figures this grass in Bulletin No 17 of the United States Department of Agriculture (Division of Agrostology), fig. 589, and says that, as far as the United States is concerned, it is found on the borders of brackish marshes, from Maryland to southern Virginia, New Jersey (received from ships' ballast) and California. He further states that it came from Europe.

EXPLANATION OF PLATE.

1. Portion of spike showing spikelets with two outer glumes.
2. Spikelet thrown open.
3. Grain.

2. **Straight Hard Grass** (*Lepturus cylindricus*, Trin.).

Botanical name.—*Cylindricus*, Latin, cylindrical, in allusion to the spike.

Botanical description (B.Fl. vii, 668)—

Habit and foliage of *L. incurvatus*, in the Australian specimens usually shorter, more tufted, the *leaves* not quite so narrow, and the spikes rather thicker and more frequently curved; but these differences are generally reversed in Mediterranean specimens.

The terminal spikelet and the internal structure of the others are the same in the two species, but the *L. cylindricus* has always only one rigid, five-nerved, very pointed, outer empty glume instead of the two of *L. incurvatus*.

Value as a fodder.—Probably the same as that of *L. incurvatus*.

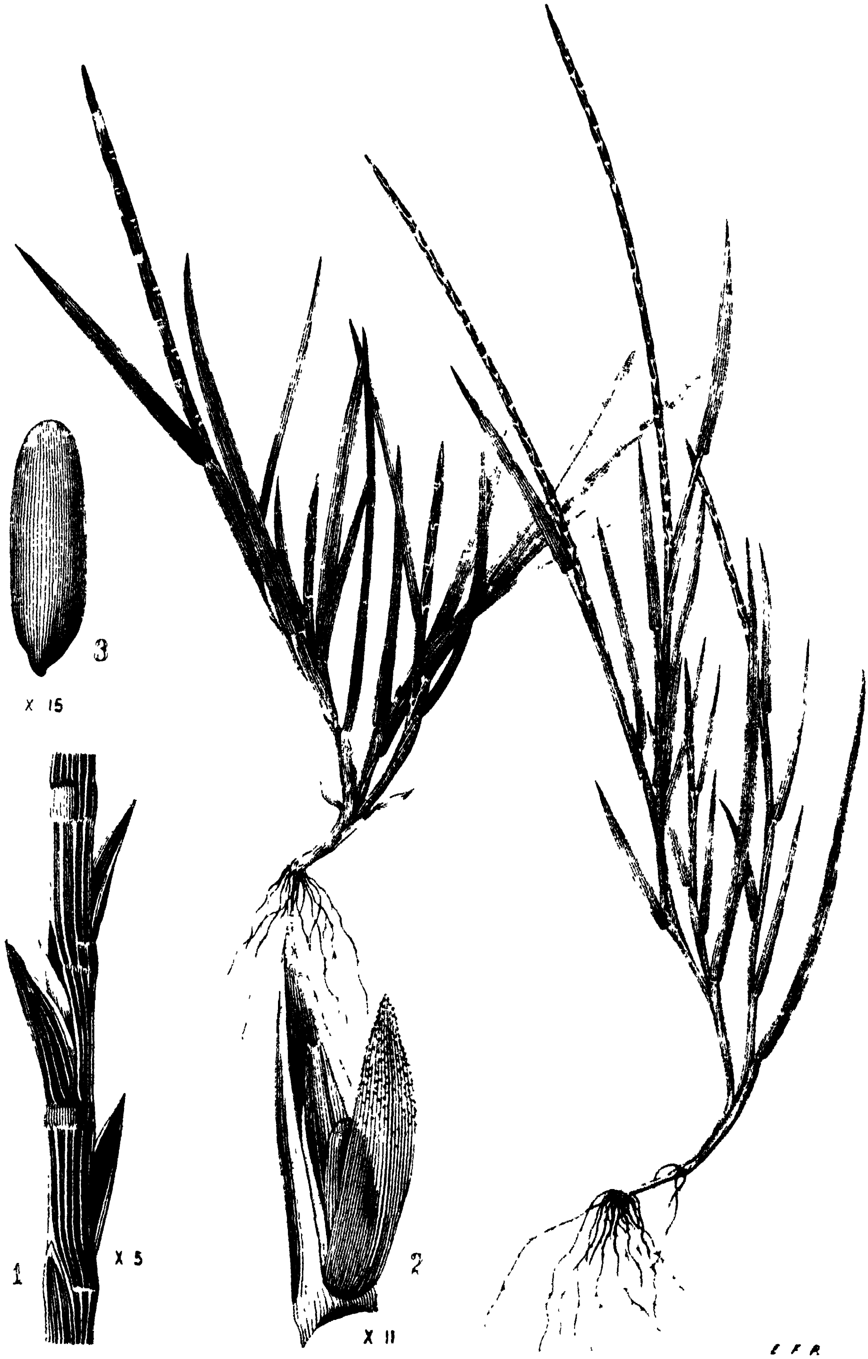
Habitat and range.—Found in all the Australian States except Tasmania and Queensland. In New South Wales, from the Coast district to the Tableland, chiefly in salt marshes, southwards from Liverpool Plains to Victoria, and south-westward to the Riverina. Found also in the Mediterranean region, South Africa, and Asia.

EXPLANATION OF PLATE.

1. Portion of spike showing spikelets with a single outer glume.
2. Spikelet thrown open.
3. Grain.

Curly Hard Grass, *Lepturus incurvatus*, **Trin.**

USEFUL AUSTRALIAN PLANTS.



Straight Hard Grass, *Lepturus cylindricus*, Trin.

USEFUL AUSTRALIAN PLANTS.

Field Experiments with Wheat.

NYNGAN DEMONSTRATION FARM, 1913.

S. RUDKIN, N.D.A., Acting Experimentalist.

The Experiments Supervision Committee, under whose control these experiments are being conducted, wish to draw the attention of farmers to the fact that final conclusions cannot yet be drawn from these trials, as they have only been conducted for a few years. Later, when results for, say, five years are available, a summary will be prepared, as sufficient evidence should then be available to enable conclusions to be formed. Meanwhile it is felt that the public are entitled to know the results obtained each year.

THE wheat experiments at this Farm were carried out in Paddock No. 5, and were as follow:—

Section A—{ Feeding-off trial (Block A)
Variety trials (Blocks B, C, D, and E)

Section B—Thick and thin seeding trials (Blocks A, B, and C).

Section C—{ Ploughing experiment (Block A).
Manurial trials (Block B).

Section D—Fertiliser trials ..{ Experiment XIV (Block I).
" III (Block II).
" IV (Block III).
" V (Block IV).
" VI (Block V).

History of Paddock.

No. 5 was occupied by a crop of rape in the early part of 1912, which was fed off and the land ploughed 6 inches deep with the disc in July, 1912, crossways of the plots except the ploughing experiment, for which each plot received its special ploughing. As practically no rain fell before December, surface cultivation was unnecessary during the preceding months. In January the land was worked with the spring-tooth; again in February with the disc cultivator 3 inches deep to kill weeds and form a soil mulch, thus conserving the soil moisture; and in March with the spring-tooth. Just prior to planting, the seed-bed was worked down with harrows, and in some cases followed with the roller. The seed-bed in every case was all that could be desired, *e.g.*, clean, deep, friable, and containing sufficient moisture to germinate the seed at once.

The paddock had not been cropped for wheat before.

The growing crops made such luxuriant growth that no harrowing to preserve a mulch was necessary except in the case of the late plantings.

Season.

1913 affords a striking example of the uncertain rainfalls to be expected in the West Bogan district. The major portion fell during the early-growing

period. Seasonable showers at seed time resulted in immediate and excellent germination. Between the 22nd and 24th June a fall of 4 inches was recorded, which was followed up by a long dry spell. July, August, and September registered only 82 points; thus the heavy yields anticipated were not realised. Several experiments had to be cut for hay, because it was deemed unwise to reserve them for grain. The last frost was recorded on 2nd September, and no hot winds were experienced before harvest time.

Appended are the monthly rainfalls recorded in 1913, 1912, and 1911:—

Month.	1913.	1912.	1911.	Month.	1913.	1912.	1911.
January	72	1	126	September	17	1	132
February	226	28	240	October	77	47	17
March	182	25	15	November	53	15	210
April	89	0	0	December	126	75	443
May...	253	0	183				
June	456	330	48	Total	16·16	9·92	18·18
July	29	257	64				
August	36	143	230	Number of wet days .	49	37	53

As was expected, as the result of a favourable seed-time the contrasts between the early, mid-season, and late plantings were very marked, as also was the case with the early and late maturing varieties.

The early plantings gave the heaviest yields for hay, and the early maturing wheats in the late plantings yielded best for grain.

EXPERIMENT I.—VARIETY TRIALS.

The following trials were carried out in paddock No. 5, Section A:—

Block B—Early planting, fed-off.

Block C Early planting, not fed-off.

Block D—Mid season planting.

Block E—Late planting.

All the varieties were sown at the rate of 27 lb. of grain per acre (treated with $1\frac{1}{2}$ per cent. copper sulphate and 1 per cent. lime water). Quantity of manure used = 30 lb. superphosphate (35-37 per cent.) per acre.

Block B was fed-off on 20th April, and again on 18th June.

VARIETY TRIALS—SUMMARY OF TREATMENT.

Experiment.	Crop.	Date planted.	Date harvested.	Rainfall during actual growth.
				inches.
Block B—Early planting, fed-off.	Hay ...	14 March ...	25 September ...	9·74
	Grain ...	14 ,, ..	21 October ...	10·01
Block C—Early planting, not fed-off.	Hay ...	14 ,, ...	3 September ...	9·69
	Grain ...	14 ,, ...	10 October ...	9·86
Block D—Mid-season planting	Hay ...	14 April ...	24 September ...	7·61
	Grain ...	14 ,, ...	10 October ...	7·73
Block E—Late planting ...	Hay ...	19 May... ...	6 October ...	5·36
	Grain ...	19 ,, ...	5 November ...	6·27

Remarks.

Block B.—The heavy stooling, later varieties—Warren, Federation, and Steinwedel—gave the heaviest returns for hay; while for grain, Florence, Federation, and Steinwedel yielded best. It is worthy of note that Sunset (a very early variety) gave very poor returns both for hay and grain.

Block C.—Firbank came out on top for hay, followed by Steinwedel, Warren, John Brown, and Florence. Sunset was cut green on 12th June, yielding 30 cwt. of green stuff per acre. This variety should not be sown in early plantings, as it matures quite out of season, the ears peeping, in this case, six weeks from planting. Firbank gave the highest yield for grain. The varieties in every plot were frost-bitten to a greater or less degree.

Block D.—Warren, Florence, Firbank, Bunyip, and Sunset were the most prominent in this block for hay, while Florence came out best for grain. Warren is a wheat that the season appeared to suit in all plantings, and will no doubt prove a useful variety for Nyngan. Sunset in this block was very much frost-bitten (many "deaf" heads were noted).

Block E.—Warren, Sunset, Bunyip, and Florence gave higher yields than Firbank (the check variety). Over 30 cwt. of hay per acre on 5·36 inches of rain is a good return for Nyngan, and serves to demonstrate that varieties thoroughly acclimatised to dry conditions can mature on a limited rainfall. Sunset showed out very prominently for grain, yielding 22 bushels per acre, and bears out the Department's recommendation that a very early maturing wheat gives the best return for the semi-arid west, as there is less risk of the hot winds drying the plant off before reaching maturity.

TABLE I.—Showing results of Variety Trial, 1913, Early Planting, fed-off.

SECTION A, BLOCK B.

Area of plots—hay, $\frac{1}{20}$ acre; grain, $\frac{1}{25}$ acre.

Plot No.	Variety.	Hay: Yield per acre. t. c. q. lb.	Hay: Percentage.	Grain: Yield per acre. bus.	Grain: Percentage.
1 (*check*)	Firbank	1 7 2 0	100	10·0	100
2	Steinwedel	1 7 3 12	104·3	13·7	141·5
3	Comeback	1 4 0 12	92·5	11·7	123·4
4 (*check*)	Firbank	1 5 0 20	100	9·2	100
5	Florence	1 6 2 12	104·6	14·2	156·8
6	John Brown	1 9 1 24	114·8	10·4	117·2
7 (*check*)	Firbank	1 5 3 16	100	8·7	100
8	Federation	1 10 0 0	112·5	14·6	169·2
9	Bunyip	1 5 0 20	91·7	7·9	93·5
10 (*check*)	Firbank	1 8 0 24	100	8·3	100
11	Sunset	0 9 3 8	37·8	1·2	15·3
12	Warren	1 11 0 8	134·9	12·9	160·5
13 (*check*)	Firbank	1 1 1 20	100	7·9	100

Rainfall during growth—hay, 9·74 inches; grain, 10·01 inches.

TABLE II.—Showing results of Variety Trial, 1913—Early Planting, not fed-off.

SECTION A, BLOCK C.

Area of hay plots, Nos. 1–11, $\frac{1}{20}$ acre; Nos. 12–13, ·096 acre; grain, $\frac{1}{25}$ acre.

Plot No.	Variety.	Hay.		Grain.	
		Yield per acre.	Percentage.	Yield per acre.	Percentage.
		t. c. q. lb.		bus.	
1 (*check*) ...	Firbank	3 5 3 16	100	18·9	100
2	Steinwedel	3 1 3 4	96·9	14·2	77·1
3	Comeback	2 8 2 8	78·8	10·4	58·4
4 (*check*) ..	Firbank	2 19 1 24	100	17·3	100
5	Florence	2 12 1 8	87·4	10·0	62·6
6	John Brown	2 12 2 20	87·5	5·4	36·9
7 (*check*) ...	Firbank	3 0 2 4	100	13·3	100
8	Federation	2 11 1 0	85·9	10·4	......
9	Bunyip	2 11 1 0	87·2	4·2	......
10 (*check*) ...	Firbank	2 17 3 12	100	cut for hay.	
11	Sunset	cut green.			
12	Warren	3 3 0 6	100·2		
13 (*check*) ...	Firbank	3 5 2 14	100		

Rainfall during growth—hay, 9·69 inches; grain, 9·86 inches.

TABLE III.—Showing results of Variety Trial, 1913—Mid-season Planting.

SECTION A, BLOCK D.

Area of plots Nos. 1–10 and 12–13, $\frac{1}{20}$ acre. Plot No. 11, ·09 acre.

Plot No	Variety.	Hay.		Grain.	
		Yield per acre.	Percentage.	Yield per acre.	Percentage.
		t. c. q. lb.		bus.	
1 (*check*) ...	Firbank	2 19 0 12	100	10·8	100
2	Steinwedel	2 12 0 4	82·5	14·2	130·8
3	Comeback.	2 18 3 0	94·2	15·0	138·4
4 (*check*) ...	Firbank	3 3 3 20	100	10·8	100
5	Florence	3 6 0 8	105·5	15·8	140·7
6	John Brown	2 14 2 16	89·1	cut for hay.	
7 (*check*) ..	Firbank	3 0 0 0	100	12·1	100
8	Federation	2 14 0 12	86·1	13·7	105·2
9	Bunyip	2 19 1 24	90·6	11·8	84·6
10 (*check*) ...	Firbank	3 8 1 16	100	15·0	100
11 ..	Sunset	cut for grain.		9·2	65·9
12 . ..	Warren	3 8 3 20	103·8	15·4	118
13 (*check*) ...	Firbank	3 5 1 12	100	12·1	100

Rainfall during growth—hay, 7·61; grain, 7·73 inches.

TABLE IV.—Showing results of Variety Trial, 1913—Late Planting.
SECTION A, BLOCK E.
Area of plots—hay, $\frac{1}{20}$ acre; grain, $\frac{1}{25}$ acre.

Plot No.	Variety.	Hay.		Grain.	
		Yield per acre.	Per centage.	Yield per acre.	Per-centage.
		t. c. q. lb.		bus.	
1 (*check*) ...	Firbank	1 10 2 24	100	12·9	100
2	Steinwedel	1 8 1 16	88·8	17·5	135·2
3	Comeback	1 12 0 2	96·2	12·1	91·5
4 (*check*) .	Firbank	1 14 1 24	100	13 3	100
5	Florence	1 15 2 4	102·4	12·9	98·9
6 .	Thew	1 10 3 16	85·9	12·3	96·1
7 (*check*) ...	Firbank	1 15 0 20	100	12·5	100
8 .	Federation . .	1 5 3 16	75·8	14·6	114·1
9	Bunyip	1 17 2 0	113·9	16·4	126·1
10 (*check*) .	Firbank	1 12 0 16	100	13 3	100
11	Sunset	1 16 2 12	113 7	22·1	152·8
12 .	Warren	1 19 2 16	122·8	16·2	104 5
13 (*check*) ...	Firbank	1 12 1 8	100	16·6	100

Rainfall during growth—hay, 5·36; grain, 5·98 inches.

EXPERIMENT II.—THICK AND THIN SEEDING TRIALS.

Object :—To determine the most suitable amount of seed to sow per acre, with an early maturing variety and a late maturing variety when sown early, mid-season, and late.

The varieties used were :—

Comeback, early variety and sparse stooler;
Steinwedel, late variety and heavy stooler.

Quantities of seed planted :—

Thin seeding—17 lb. per acre.
Medium „ 27 lb. „
Heavy „ 42 lb. „

Quantity of manure sown :—

30 lb. per acre of superphosphate.

The trials were divided into three blocks :—

Block C—Early planting.
Block B—Mid-season.
Block A—Late planting.

Each block was planted on the following plan :—

No. of Plot.	Variety.	Seed per acre.
		lb.
1	Steinwedel	17
2	„	27
3	„	42
4	Comeback	42
5	„	27
6	„	17

The dates planted and harvested, together with rainfall received during actual growth, were practically the same as for the corresponding seasons in the variety trials.

Remarks.

Block C.—As the seed-time was very favourable the yields of hay from the different seedings were fairly even, as the thin-seeding plots stooled very heavily and appeared at harvest time to be almost as thick as the thick-seeding. The bulk was greater from the Steinwedel plots than from the Comeback, but the proportion of flag to stem was higher in the former, consequently the hay was lighter bulk for bulk. For grain the thin-seedings came out on top.

Block B.—The heavy seeding (12 lb.) gave the highest returns for hay, while the light seeding produced the most grain.

Block A.—The heavy seeding yielded best for hay and grain with Steinwedel, and the medium seeding yielded best for hay and grain with Comeback. The results appear to suggest that the later the planting the heavier the seeding required, and, inversely, the earlier the planting the lighter the seeding. Comeback is not a suitable variety for this trial, as up to the present it has been susceptible both to frosts and hot dry winds. An early variety such as Florence or Firbank would be more reliable to compare with Steinwedel.

TABLE V.—Showing results of Thick and Thin Seeding Trials, 1913—Early Planting.

SECTION B, BLOCK C.

Area of Plots, $\frac{1}{10}$ acre.

Plot No.	Variety.	Seed sown per acre	Hay.		Grain.	
			Yield per plot.	Yield per acre.	Yield per plot.	Yield per acre.
		lb.	lb.	t. c. q. lb.	lb.	bus.
1	Steinwedel	17	563	2 10 1 2	64	13·3
2	,, ...	27	605	2 14 0 2	54	11·2
3	,, ...	42	649	2 17 3 22	59	12·3
4	Comeback	42	598	2 13 1 16	43	8·9
5	,, ...	27	622	2 15 2 4	67	13·9
6	,, ...	17	553	2 9 1 14	87	18·1

Rainfall during growth—hay, 9·74 inches; grain, 9·86 inches.

TABLE VI.—Showing results of Thick and Thin Seeding Trials, 1913—Mid-season Planting.

SECTION B, BLOCK B.

Area of plots for hay, $\frac{1}{10}$ acre; for grain, $\frac{2}{25}$ acre.

Plot No	Variety.	Seed sown per acre	Hay.		Grain.	
			Yield per plot.	Yield per acre.	Yield per plot.	Yield per acre.
		lb.	lb.	t. c. q. lb.	lb.	bus.
1	Steinwedel	17	512	2 5 2 24	71	14·8
2	"	27	617	2 15 0 10	68	14·2
3	"	42	609	2 14 1 14	51	10·6
4	Comeback	42	683	3 0 3 26	38	7·9
5	"	27	649	2 17 3 22	52	10·8
6	"	17	553	2 9 1 14	54	11·2

Rainfall during growth—hay, 7·61 inches; grain, 7·73 inches.

TABLE VII.—Showing results of Thick and Thin Seeding Trials, 1913—Late Planting.

SECTION B, BLOCK A.

Area of plots for hay, $\frac{1}{10}$ acre; for grain, $\frac{2}{25}$ acre.

Plot No.	Variety.	Seed sown per acre	Hay—yield per acre.	Grain—yield per acre.
		lb.	t. c. q. lb.	bus.
1	Steinwedel	17	1 1 1 0	12·1
2	"	27	1 5 3 16	13·3
3	.. ..	42	1 6 2 12	13·5
4	Comeback	42	1 6 1 10	11·6
5	"	27	1 8 0 24	12·9
6	"	17	1 5 3 26	12·5

Rainfall during growth—hay, 5·36 inches; grain, 5·98 inches.

EXPERIMENT III.—SOURCE OF PHOSPHORIC ACID.

Object:—To determine the most suitable and economic source of phosphoric acid to use in the Nyngan district.

The following phosphatic manures were tested, *e.g.*, bone-dust, superphosphate, rock-phosphate, bone-char, and Thomas' phosphate. As bone-dust also contains organic nitrogen, blood was applied to all the other plots which received phosphatic fertilisers. In order to check a deficiency in potash, sulphate of potash was also applied to each plot. The check plots received no phosphatic dressing, *e.g.*, blood and sulphate of potash.

The fertilisers applied in quantities equivalent to—phosphoric acid, 12 lb. per acre; potash, 7½ lb. per acre, and organic matter equal to that contained in 54½ lb. of bone-dust.

Planted with Steinwedel at the rate of 27 lb. treated grain per acre on 24th April, and harvested for hay on 3rd October.

TABLE VIII.—Showing results of Experiment III, 1913.

SECTION D, BLOCK II.

Area of plots—·096 acre.

Plot No.	Fertiliser per Acre.		Hay. Yield per acre.	Hay. Percentage.
		lb.	t. c. qr. lb.	
1 (*check*)	Dried blood	15	2 9 1 15	100
	Sulphate of potash	14½		
2	Bone-dust	54¼	2 10 2 21	99·4
	Sulphate of potash	14½		
3	Superphosphate	70	2 11 3 16	98·5
	Dried blood	15		
	Sulphate of potash	14½		
4 (*check*)	Dried blood	15	2 14 0 25	100
	Sulphate of potash	14½		
5	Rock phosphate	37½	2 12 2 5	98·2
	Dried blood	15		
	Sulphate of potash	14½		
6	Bone char	20	2 11 2 23	97·8
	Dried blood	15		
	Sulphate of potash	14½		
7 (*check*)	Dried blood	15	2 12 0 20	100
	Sulphate of potash	14½		
8	Thomas' phosphate	66⅝	2 9 0 1	97·1
	Dried blood	15		
	Sulphate of potash	14½		
9	No manure		2 17 0 22	117·2
10 (*check*)	Dried blood	15	2 7 0 7	100
	Sulphate of potash	14½		

Note the increased yield from plot No. 9, which received no fertiliser.

This would indicate that in the present state of fertility of the soil very light applications, if any, are advisable, as dry spells are likely to occur in any season during the growth of the crop, when those crops which have been least forced by fertilisers will be able to withstand the dry conditions for a longer period, thus having a greater chance of reaching maturity.

Remarks.

All the plots made good growth from the start, and little difference was noticed between the individual plots until the hot dry spell set in. It will be noticed the "no manure" and check plots gave the best returns, the extra quantities of manure applied to the others evidently reducing the yields. Comparing the phosphatic manures, there appears to be little difference between them, and from personal observation such appeared to be the case. No doubt if the quantities of the manures were decreased the contrasts would be greater.*

* It has since been decided by the Experiments Supervision Committee to reduce the amount of the various fertilisers to a half of the quantities mentioned.—ED.

EXPERIMENT IV.—WHEAT MANURIAL TRIAL.

Object :—To determine the effect on the yield of wheat for hay or grain of the application of simple and mixed fertilisers when applied at the same time that the wheat is planted, and to soil in which the fertility is kept up by a suitable rotation.

Sulphate of ammonia, sulphate of potash and superphosphate, singly and in combination, are being compared with each other, and also with the results from unmanured land. A mixture of blood, superphosphate and sulphate of potash is also compared with a mixture of sulphate of ammonia, superphosphate, and sulphate of potash, to determine whether the organic form of nitrogen (in blood) can replace the nitrogen in sulphate of ammonia. When the rotation crops are planted, each plot receives a "complementary manure," so that in the complete rotation each plot is given the quantity of plant food intended for the rotation.

Plant food was applied as under :—

Phosphoric acid...	12 lb.	per acre.
Potash	7½ lb.	"
Nitrogen, about	4 lb.	"

Date planted, 23rd April. Date harvested, 4th October.

Planted with Steinwedel at the rate of 27 lb. of treated grain per acre, and harvested for hay.

Remarks.

The superphosphate (70 lb.) plot gave the highest return, and it is noticeable all the mixtures containing superphosphate yielded best. Sulphate of potash (14½ lb.) gave a better yield than either the "no manure" or "sulphate of ammonia" (20 lb.) plots. The latter encourages excessive leaf-growth, and consequently the plots do not stand the hot dry times.

TABLE IX.—Showing results in Experiment IV, 1913—Wheat Manurial Trial. SECTION D, BLOCK III. Area of Plots—·096 acre.

Plot No.	Fertiliser per acre.		Hay. Yield per acre.	Hay. Percentage.
		lb.	t. c. qr. lb.	
1 (*check*) ...	No manure		2 11 2 11	100
2	Sulphate of ammonia	20	2 6 2 0	92·2
3	Superphosphate	70	2 15 2 13	117·1
4 (*check*) ...	No manure		2 4 2 5	100
5	Sulphate of potash	14½	2 8 3 9	105·3
6	Sulphate of ammonia ... ... Superphosphate	20 70	2 9 3 11	103·3
7 (*check*) ...	No manure		2 9 3 21	100
8	Sulphate of ammonia ... ... Sulphate of potash	20 14½	2 5 1 15	92·5
9	Superphosphates ... . Sulphate of potah	70 14½	2 9 0 22	102 2
10 (*check*) ...	No manure		2 7 1 10	100
11	Sulphate of ammonia ... ... Superphosphate ... ... Sulphate of potash	20 70 14½	2 6 0 25	102
12	Dried blood ... ... Superphosphate ... ... Sulphate of potash	15 70 14½	2 4 1 2	102·4
13 (*check*) ..	No manure		2 1 0 22	100

Rainfall during growth, 7·61 inches.

EXPERIMENT V.—FERTILISER TRIAL.

Object :—To determine the chemical requirements of the soil by the effect upon the yield of wheat or hay of the continued application of simple and mixed fertilisers to the same land, and to soil in which the supply of organic matter is kept up by a suitable rotation.

In this experiment the fertilisers are applied directly to the wheat; in Experiment VI they are applied to the rotation crop, the wheat being sown without manure. The manures used were the same as for Experiment IV, and were planted on the same plan.

Experiment V was planted on 24th April with Steinwedel at the rate of 27 lb. treated grain per acre. The manure was applied with the seed according to plan. Harvested for hay, 6th October.

Remarks.

The superphosphate plot gave the best return, and was noticed at harvest time to be withstanding the dry weather better than the others.

The complete mixture containing nitrogen in the form of ammonium sulphate appears to be slightly better than the organic nitrogen mixture, but to the eye the two plots presented no difference when growing.

As this was the first crop of wheat taken off this paddock, the results have no bearing as yet on the object of the experiment, except in so far as to show which is the best simple manure or mixture to apply with the wheat on virgin land.

TABLE X.—Showing results of Experiment V, 1913—Fertiliser Trial.
SECTION D, BLOCK IV.
Area of plots—·096 acre.

Plot No.	Fertiliser per Acre.		Hay. Yield per acre.	Hay. Percentage.
		lb.	t. c. qr. lb.	
1 (*check*)	No manure	..	2 5 0 1	100
2	Sulphate of ammonia	20	2 1 3 1	94·9
3	Superphosphate	70	2 12 1 12	121·7
4 (*check*)	No manure	...	2 2 0 4	100
5	Sulphate of potash	14½	2 2 1 7	95·4
6	Sulphate of ammonia Superphosphate	20 70	2 8 2 17	104·2
7 (*check*)	No manure	...	2 9 0 1	100
8	Sulphate of ammonia Sulphate of potash	20 14½	2 5 2 8	93·6
9	Superphosphate Sulphate of potash	70 14½	2 5 1 26	91·5
10 (*check*)	No manure	.	2 8 2 7	100
11	Sulphate of ammonia Sulphate of potash Superphosphate	20 14½ 70	2 9 2 8	104·4
12	Dried blood Sulphate of potash Superphosphate	15 14½ 70	2 6 2 10	100·4
13 (*check*)	No manure	...	2 5 1 5	100

Rainfall during growth—7·61 inches.

EXPERIMENT XIV.—TIME OF APPLYING FERTILISER.

Object :—To determine what is the most suitable time to apply the manure.

Section A.—With a complete manure, consisting of superphosphate, 70 lb. per acre; sulphate of ammonia, 20 lb. per acre; sulphate of potash, 14½ lb. per acre.

Section B.—With a simple manure—superphosphate, 70 lb. per acre.

Date planted, 28th April.

Date harvested, 30th September.

Both sections were planted on the same plan, *e.g.* :—

No. of Plot.	Particulars of Manuring.
1 (*check*)... ...	Manured, applied with seed
2	,, ,, before seed.
3	,, broadcasted before seed.
4 (*check*)... ..	,, applied with seed.

The drill was run over all the plots twice in the case of Nos. 2 and 3, first with the seed-box out of gear and the fertiliser sowing; secondly, with the seed box in gear and the fertiliser thrown out of gear. For No. 3 the drill tubes were taken out of the hoes and the manure allowed to fall on the ground in front of the hoes, the latter helping to cover and mix the manure with the surface soil. The drill was run over Plots 1 and 4 empty the first time, and with the seed and fertiliser sowing the second.

Remarks.

The results of this experiment are very striking, and many object lessons in dry-farming can be drawn from them.

Section A.—Complete manure applied. Plots 1 and 4 at the outset looked very promising, but when the dry spell set in the excessive leaf growth made by the plants taxed the store of soil moisture to such an extent that a week or two prior to harvesting they commenced to burn off and many failed to come out in ear. On the other hand, Plots 2 and 3 withstood the dry weather better; the plants had not stooled so heavily, consequently the reserve of soil moisture was greater, sufficient to keep the plants from being burnt up before harvest time. Plot 3 yielded better than No. 2.

Section B—Superphosphate applied.—It is noticeable that the results of Section B are the reverse of Section A. This suggests that the heavy manuring of 104½ lb. per acre (with such concentrated manures as sulphate of ammonia and sulphate of potash included) is unsuited to semi-arid conditions. One would suggest that these amounts be decreased to half the quantities (as applied at present) when the returns from each plot would be more constant. It is interesting to note that the fertiliser trials at Nyngan for the last three years have given lower returns than the rest of the experiments, and the above striking results suggest that the dressings have been too heavy.

TABLE XI.—Showing results of Experiment XIV, 1913—Time of applying Fertiliser.

SECTION D, BLOCK I.

Area of plots—·096 acre.

Block.	Plot No.	Class of Fertiliser.	Fertiliser - when applied.	Hay. Yield per acre.	Hay. Percentage.
				t. c. q. lb.	
A	1 (*check*) ..	Complete	Manure applied with seed ...	2 10 2 0	100
A	2 ...	,,	,, ,, before seed ..	2 11 1 10	106·2
A	3 ...	,,	,, broadcasted before seed...	2 13 1 5	115·4
A	4 (*check*)...	,,	,, applied with seed ...	2 3 3 27	100
B	1 (*check*)...	simple ..	Manure applied with seed ...	2 11 2 13	100
B	2 ...	,,	,, ,, before seed .	2 9 0 1	98·2
B	3 ...	,,	,, broadcasted before seed .	2 5 3 1	94·9
B	4 (*check*)..	,,	,, applied with seed ...	2 6 2 0	100

FEEDING-OFF TRIAL.

Object :—To find whether it is advantageous to feed-off wheat when sown early and mid-season as against mid-season and late plantings not fed-off.

Variety sown.—Steinwedel at the rate of 27 lb. of treated grain per acre.

Manure used, about 30 lb. superphosphate (35 to 37 per cent.) per acre.

Length of plots—8·25 chains. Width of plots—12 links.

TABLE showing details of Planting, Feeding off, and Harvesting.

No. of Plot.	Date Planted.	Date Fed off.	Date Harvested. For Hay.	Date Harvested. For Grain.
1 (*check*) ..	Early planting, 14 March ...	Mid-season, 20 April	25 Sept....	16 Oct.
2	,, ,, ..	Late, 20 May ...	25 ,, ...	16 ,,
3	Mid-season planting, 14 April	Late, 20 May ...	25 ,, ...	21 ,,
4 (*check*) ..	Early planting, 14 March ...	Mid-season, 20 April	25 ,, ...	16 ,,
5	Mid-season planting, 14 April	Not fed-off	25 ,, ...	21 ,,
6	Late planting, 19 May ...	,, .. .	30 ,, ...	5 Nov.
7 (*check*) ...	Early planting, 14 March ...	Mid-season, 20 April..	25 ,, ...	16 Oct.

The plots fed-off received a light harrowing immediately the sheep were taken off.

Remarks.

This experiment was tried in 1912, but the grain failed to germinate before the June rains; consequently no feeding-off could be carried out. The season 1913 was favourable for this trial; each planting germinated at once and was fed-off according to directions. As was to be expected with a

variety such as Steinwedel, the early planting (fed-off) mid-season gave the highest return for hay, while the mid-season (not fed-off) yielded best for grain. It is worthy of note that with a heavy stooling variety like Steinwedel the feeding-off with sheep of early plantings in a season like 1913 is justifiable, but whether future results over a further number of years will bear this out remains to be seen. Again, wheats of the Steinwedel class are gradually being displaced in the west by sparsely stooling varieties, and it is very questionable whether feeding-off, except in extreme cases, will be sound practice.

TABLE XII.—Showing results of Feeding-off Trial, 1913. Variety, Steinwedel.

SECTION A, BLOCK A.

Area of plot for hay, $\frac{1}{20}$ acre ; for grain, $\frac{1}{25}$ acre.

Plot No.	Hay.			Grain.		
	Rainfall during growth.	Yield per acre.	Percentage	Rainfall during growth.	Yield per acre.	Percent a
	in.	t. c. q. lb.		in.	bus.	
1 (check)	9·74	2 16 0 9	100	10·01	18·5	100
2	9·74	2 1 3 20	84·4	10·01	19·8	106·3
3	7·61	1 6 1 0	44	7·73	11·2	60·2
4 (check) ...	9·74	3 1 1 20	100	10·01	18·7	100
5	7·61	2 3 3 20	76·4	7·73	20·8	109·4
6	5·24	0 19 2 16	36·4	5·36	12·9	66·9
7 (check)	9·74	2 10 0 0	100	10·01	19·6	100

PLOUGHING EXPERIMENT.

The plots in this experiment received their special ploughings and workings each time the paddock was under the plough, *i.e.*, not only for the wheat crop, but also for the fodder crop in the rotation, thus the same plot received the same ploughing since the initiation of the experiment. As the land under this experiment has been broken up recently the results are not so striking as might be the case after several croppings.

Length of plots, 8·25 chains. Width of plots, 24 links.

Steinwedel was planted on 10th April, at the rate of 27 lb. of treated grain per acre. Superphosphate (about 30 lb. per acre) was sown with the seed.

Date harvested for hay, 22nd and 23rd October.

Rainfall during actual growth, 7·61 inches.

Plots Nos. 17, 17A, 18, 18A, 23, and 24 were ploughed prior to planting, and subpacked and harrowed according to plan. The seed-bed was all that could be desired save the reploughed plots, the surface of which was uneven and consequently germination was inferior in these plots. The unevenness of the seed-bed appeared to have a direct bearing on the germination of the seed in such a semi-arid district as Nyngan.

Plan of Ploughing Experiment.

Every third plot a check, *e.g.*, Disc plough 6 inches deep.

No. of Plot.	Plough.	Depth.	Subsequent Cultivation.
		inches.	
1	Disc	6	
2	Disc	3	
3	Mould-board ..	3	
4	Disc	6	
5	Disc	4	
6	Mould-board ..	4	
7	Disc ...	6	
8	Mould-board ...	6	
9	Disc	6	Subpacked, not reploughed.
10	Disc	6	
11	Disc	8	
12	Mould-board ...	8	
13	Disc	6	
14	Mould-board ...	8	Subsoiled to 10 inches.
15	Mould-board ..	4	Subsoiled to 10 inches.
16	Disc	6	
17 17A	Disc	6	Not subpacked } Reploughed just prior to planting. { Not subpacked. Subpacked.
18 18A	Disc	6	Subpacked } Reploughed just prior to planting. { Subpacked. Not subpacked.
19	Disc	6	
20	Mould-board ...	6	Subpacked, not reploughed.
21	Disc	6	Subpacked, not reploughed.
22	Disc	6	
23	Disc	6	Subpacked, reploughed, and subpacked just prior to planting.
24	Mould-board ..	6	Subpacked, reploughed, and subpacked just prior to planting.
25	Disc	6	

Remarks.

This experiment made luxuriant growth, yielding the heaviest crop of hay on the Farm. With the advent of hot weather several of the plots dried off quickly, and had they been saved for grain would have given a very poor return. The most noticeable feature was the benefit derived from subpacking. In every plot on which the Campbell subpacker was used the crop retained its normal colour and growth until harvest time. This may be accounted for by the fact that the subsoil at seeding time was saturated and contained sufficient moisture to mature the crop, but in all the cases except the subpacked plots the movement of soil moisture to the plant was insufficient to keep the plants from drying off. As regards the different ploughs, the results appear to verify the results of previous experiments, *i.e.*, there is little difference between the different ploughs; and also that there is no advantage to be gained from deep ploughing.

TABLE XIII.—Showing results of Ploughing Experiment, 1913.

Area of Plots—·192 acre; excepting Nos. 17–18A, which were ·096 acre.

Plot No.	Treatment of Plot.	Hay. Yield per acre.	Hay. Percentage.
		t. c. q. lb.	
1 (check) ...	Ploughed 6 in. deep with disc plough	2 19 3 21	100
2 ...	" 3 in. " "	2 15 2 2	95·6
3 ...	" 3 in. " mould-board plough .	2 13 1 25	95·2
4 (check) ...	" 6 in. " disc	2 14 1 2	100
5 ...	" 4 in. " "	2 14 2 0	101·1
6 ...	" 4 in. " mould-board	2 11 3 16	97·8
7 (check) ...	" 6 in. " disc	2 12 1 23	100
8 ...	" 6 in. " mould-board	2 13 0 12	100·3
9 ...	" 6 in. " disc, subpacked, not reploughed.	2 16 0 9	104·8
10 (check) ...	" 6 in. " disc	2 13 3 27	100
11 ...	" 8 in. " "	2 12 3 14	97·5
12 ..	" 8 in. " mould-board	2 11 3 27	95·5
13 (check) ..	" 6 in. " disc	2 14 2 14	100
14 .	" 8 in. " mould-board, subsoiled to 10 in.	2 13 2 7	98·3
15 ..	" 4 in. " mould-board, subsoiled to 10 in.	2 11 0 12	94·2
16 (check) .	" 6 in. " disc	2 14 0 9	100
17 ...	" 6 in. " disc, not subpacked, re-ploughed, not sub-packed.	2 13 2 20	100·7
17A ...	" 6 in. " disc, not subpacked, re-ploughed, and sub-packed.	2 18 0 24	110·7
18 ...	" 6 in. " disc, subpacked, re-ploughed, and sub-packed.	2 12 2 26	101·8
18A ..	" 6 in. " disc, subpacked, re-ploughed, and not sub-packed.	2 18 1 7	114·2
19 (check) ...	" 6 in. " disc	2 10 1 7	100
20 ...	" 6 in. " mould-board, sub-packed, not reploughed.	2 12 3 20	102·9
21 ...	" 6 in. " disc, subpacked, not re-ploughed.	2 12 0 20	98·7
22 (check) ...	" 6 in. " disc	2 14 0 15	100
23 ...	" 6 in. " disc, subpacked, re-ploughed, and sub-packed.	2 11 2 8	98·1
24 ...	" 6 in. " mould-board, sub-packed, reploughed, and subpacked.	2 9 2 2	96·7
25 (check) ...	" 6 in. " disc	2 9 2 24	100

AMOUNT OF FERTILISER TRIAL.

Object:—To determine which is the most suitable amount of superphosphate to apply to the wheat crop when applied at the same time as the seed.

The following amounts per acre were applied:—

30 lb. superphosphate (check) 20, 40, 50 and 60 lb. respectively.

Steinwedel was planted on 11th April at the rate of 27 lb. of treated grain per acre and harvested for hay on 23rd September.

Remarks.

The check (30 lb. per acre) plots gave the highest returns. During the early part of the growing season the more heavily manured plots appeared to be much the better, but just prior to harvest they dried up, and when harvested the flag was quite brown, whereas the lighter manured plots retained their green colour and could have stood another week or two's dry spell. The plot receiving 20 lb. per acre would have turned out best if the experiment had been saved for grain. The season was favourable for showing up the contrasts in this experiment, and appears to suggest that even in favourable seed times the lighter dressings of superphosphate are the better.

TABLE XIV.—Showing results of Amount of Fertiliser Trial, 1913.

SECTION C, BLOCK B.

Area of Plots, ·192 acre.

Plot No.	Quantity per acre.	Hay.	
		Yield per acre.	Percentage.
	lb.	t. c. q. lb.	
1 (*check*)	30	2 10 0 25	100
2	20	2 11 0 5	99 1
3	40	2 15 3 22	99·2
4 (*check*)	30	2 19 1 20	100
5	50	2 13 1 21	91·5
6	60	2 16 0 9	96·7
7 (*check*)	30	2 17 0 27	100

Rainfall during growth, 7·61 inches.

MULCHING EXPERIMENTS.

Land for these experiments was cleared in July and August, 1912, and broken up in the following September, with the special ploughs as per plan. The depth of the ploughing was 6 inches throughout, and the land was in good condition. The fallows were cultivated as per plan up to planting time in May, 1913.

All the experiments were planted with Firbank at the rate of 27 lb. of treated grain per acre, and manured with superphosphate (35-37 per cent.) at the rate of 30 lb. per acre.

Prior to planting, the whole plots were cultivated crossways with the spring-tooth to level all the plots and ensure an even seed-bed. After the first mulch the same plots were again mulched after every shower of rain of any magnitude, and whenever weed growth made it necessary. During last summer this was required nearly every month up to planting time in May.

All the sections were harrowed crossways when the crop was 4 or 5 inches high.

Date of planting—5th and 6th May. Date of harvesting—7th to 9th October.

Rainfall during actual growth—6·77 inches.

SECTION 1.—To determine the best depth of mulch.

Block I.—Plough, mould-board ; mulch, skim plough.

No. of Plot.	Depth of Mulch.	Date of First Mulch.
1 (*check*)	3 inches.	7 January.
2	2 ,,	7 ,,
3	4 ,,	7 ,,
4 (*check*)	3 ,,	7 ,,
5	6 ,,	7 ,,
6	No mulch.	7 ,,
7 (*check*) . .	3 inches.	7 ,,

Block II.—Plough, mould-board.

No. of Plot.	Mulch.	Date of First Mulch.
1 .	Tobacco stems.	8 January.
2 (*check*) .	Skim-plough, 3 inches deep.	7 ,,

The tobacco stems were spread over the surface of the plot sufficient to cover the soil. Unfortunately only enough tobacco stems to cover about half the plot was available. As nearly 3 tons of stems were required for about ⅛ acre, it has been decided to discontinue this experiment, the practical side of the work placing the trial beyond reach. Messrs. W. D. and H. O. Wills supplied the stems for trial.

Remarks.

The depth of mulch was rather a difficult one to carry out, especially with the shallow mulches such as 2 and 3 inches, as the implement could not be regulated to the exact depth where clods were present. The check plots—3-inch mulch—yielded best in every case. A marked difference between the non-mulch and the 3-inch mulched plots of 10 cwt. 3 qrs. 11 lb. per acre was obtained. As the Department strongly advocates mulching 3 inches deep to preserve a dry mulch, and thus form a protective layer over the sub-surface soil to minimise loss through surface evaporation, this result forms a striking example. The non-mulch plot was weedy and uneven before the cultivation received and just prior to planting. The growth too was very uneven and patchy, as was expected on virgin land, but the check plots were a very even lot right through, showing that good cultivation not only preserves soil moisture, but also serves to even up the same, consequently resulting in a level crop.

TABLE XV.—Showing results of Mulching Experiment, 1913.

SECTION I, BLOCKS I and II.

Mould-board plough, mulched with skim-plough.

Area of plots, ·2 acre.

Block.	Plot No.	Depth of Mulch.	Hay. Yield per acre.				Hay. Percentage.
			t.	c.	q.	lb.	
I	1 (*check*)	3 inches	2	2	1	23	100
I	2	2 "	1	19	3	23	94·1
I	3	4 "	1	19	2	26	93·6
I	4 (*check*)	3 "	2	2	1	18	100
I	5	6 "	2	1	1	0	97·3
I	6	No mulch	1	11	2	2	74·4
I	7 (*check*)	3 inches	2	2	1	13	100
II	1	Mulched with tobacco stems ...	1	17	0	16	88·9
II	2 (*check*)	3 inches	2	1	0	23	100

Rainfall during growth, 6·77 inches.

SECTION II, BLOCKS I AND II.

Object:—To determine the best implement to use for mulching.

Block I.—Plough, mould-board.

Block II.—Plough, disc.

No. of Plot.	Implement.	Date of First Mulch.
1 (*check*)	Skim-plough ..	9 January.
2	Disc cultivator ...	9 "
3	Spring-tooth ...	9 "
4 (*check*)	Skim-plough ...	9 "

Remarks.

After the mould-board plough the disc cultivator gave the best return, while the spring-tooth gave the lowest. After the disc plough, there appears to be little difference between the skim-plough and the disc cultivator. The spring-tooth plots were very patchy in both blocks.

TABLE XVI.—Showing results from Mulching Experiment, 1913.

SECTION II.

Area of plots, ·2 acre.

Block.	Plot No.	Plough.	Mulching Implement.	Hay.	
				Yield per acre.	Percentage.
				t. c. q. lb.	
I	1 (*check*) ...	Mould-board	Skim-plough	2 2 0 21	100
I	2	,,	Disc cultivator ..	2 3 0 9	102
I	3	,,	Spring-tooth	2 1 1 15	97·8
I	4 (*check*) ...	,,	Skim-plough	2 2 1 3	100
II	1 (*check*) ...	Disc	Skim-plough	1 19 0 17	100
II	2	,, ...	Disc cultivator ...	1 19 1 24	100·7
II	3	,, ...	Spring-tooth	1 16 2 2	93·1
II	4 (*check*) ..	,, ...	Skim-plough	1 19 0 27	100

Rainfall during growth, 6·77 inches.

SECTION III, BLOCKS I AND II.

Object :—To determine the best time to commence working the surface of fallowed land.

Block I.—With skim-plough mulch } Disc plough.
Block II.—With disc cultivator mulch }

Both blocks were planted on the same plan.

No. of Plot.	Date of First Mulch.	
1 (*check*)	January	9 Jan.
2	Immediately after ploughing	7 Oct.
3	Just prior to planting ...	24 April.
4 (*check*)	January	9 Jan.
5	November	14 Nov.
6	December	10 Dec.
7 (*check*)	January	9 Jan.

Remarks.

The results appear to suggest that the earlier the mulching is commenced the higher the yield. This would be the case in a season like 1913, when summer showers were frequent, with hot drying winds intervening, and evaporation very high. Again does the no-mulch plot, *i.e.*, mulched just prior to planting, show a diminished return when compared with the check plots. Mulching in the Nyngan district, where small returns are the rule and not the exception, is of primary importance, and must in no case be neglected.

TABLE XVII.—Showing results from Mulching Experiment, 1913.

SECTION III.

Disc Plough. Area of plots, ·2 acre.

Block.	Plot No.	Mulch.	Date of Mulch.	Hay. Yield per acre.	Hay. Percentage.
				t. c. q. lb.	
I	1 (*check*) ...	Skim-plough ..	January	1 16 3 14	100
I	2 ...	,, .	Immediately after ploughing.	1 19 1 4	109·6
I	3 ..	,, ...	Just prior to planting ...	1 12 0 6	88
I	4 (*check*) ...	,, ...	January . .	1 16 0 18	100
I	5 ...	,, ..	November ..	1 16 3 14	98·8
I	6 ...	,, ..	December .	1 17 3 2	98·1
I	7 (*check*) ...	,, ..	January	1 19 2 16	100
II	1 (*check*) .	Disc cultivator .	January	1 16 1 5	100
II	2 ...	,, .	Immediately after ploughing.	1 18 2 18	102·6
II	3 ...	,, ..	Just prior to planting ..	1 10 2 14	78·4
II	4 (*check*) ...	,, .	January .	1 19 2 1	100
II	5	,, ..	November .	1 17 2 15	91·1
II	6 . .	,,	December . .	1 16 3 19	88·6
II	7 (*check*) .	,,	January ..	2 2 1 3	100

SUGGESTED IMPORTATION OF MAGPIES INTO FIJI.

RECENTLY the Secretary of the Planters' Association, of Fiji, and editor of the *Planters' Journal*, communicated with the *Agricultural Gazette*, indicating that, from what experience they had of magpies in Fiji—only a few on one island—they appeared to be likely to be of great benefit to the planters there by destroying hornets and some insects attacking their coconut trees. The Association, therefore, asked to be put in communication with somebody through whom a number of these birds could be obtained at a reasonable price.

The matter was submitted to Mr. Froggatt, Government Entomologist, who reported as follows:—

There have been several importations of magpies into the Solomon Islands, but most of these birds have died out, and, as far as I can learn, no results have been obtained from their importation.

In the New Hebrides, at Ringdove Bay, there were several magpies at Zeitler and Hagon's Station, but they never went far away from the house, and fed chiefly upon geckoes and other small lizards.

The Australian magpie is a native of the open plains and lightly timbered country along the river frontages. It will not go into tropical jungle, but might thrive in open plantation country.

As all lizards are insectivorous, I would not advise the introduction of our magpie into any district where small lizards are common on the foliage, for in destroying them the magpies would do much more harm than good. In the New Hebrides the lizards are very numerous, and destroy more noxious insects than the birds.

The Director of the Royal Zoological Society can arrange to get Australian magpies for export at a reasonable rate. As magpies are protected under our "Bird Act," dealers cannot sell them.

The Value of Herd-testing.

Recognition by the Tweed River Agricultural Society.

L. T. MacINNES, Dairy Instructor.

The Tweed River Agricultural Society last year took into consideration the granting of official recognition to the work done by the various Herd-testing Associations recently established throughout the district. This Society, like others in the dairying districts, has been offering prizes for cows giving the highest yield in butter fat in twenty four hours. The owner of the competing cow could advise the secretary of the Society at any time during the year when he was ready to have the test carried out, and the official tester had to be on the farm at the time notified to take the samples and test them.

Naturally, cows tested under these circumstances were always taken at their best. The fallacy of judging a cow's productive powers on one single twenty-four hours' testing (evening and morning's milkings) during the twelve months is apparent. Such a test would give no true indication of how much better that cow would yield in her lactation period or over a given time, say, of six, nine, or twelve months. It was also pointed out that individual cows entered for these competitions were generally "forced," and the knowledge of the yields they gave were of little commercial value to the ordinary dairyman unless the cost of food consumed was shown at the same time. If the prizes were given for the highest production of a herd over a lengthy period, individual forcing would not be practicable.

Agricultural Societies in carrying out such contests as they had been holding, employed an official tester, paying him at the rate of £1 for every animal tested—-taking samples of evening and morning's milk. It was suggested that the Society should :—

(1) Do away with the expense incurred by paying a tester of its own,

(2) utilise the records of the Herd-testing Associations in operation throughout the district,

(3) give a good prize for the best yielding herd, as shown by the records of any registered Herd-testing Association over a period of not less than six months, and

(4) later on, when herd testing had been in operation for some years, a prize might be given for the herd showing the best butter yields from, say, three generations of milkers.

The value of No. 4 would lie in the indication it would give as to whether the butter-producing type was being improved upon. Take two instances :—

(1)	Grand-dam's yield in	12 months	200 lb.	butter.
	Dam's ,, ,,	12 ,,	250 ,,	,,
	Daughter's ,, ,,	12 ,,	300 ,,	,,
	Total ...	... ...	750 ,,	,,
(2)	Grand-dam's yield in	12 months	250 ,,	,,
	Dam's ,, ,,	12 ,,	250 ,,	,,
	Daughter's ,, ,,	12 ,,	250 ,,	,,
	Total ...	... ...	750 ,,	,,

Though the total yields of both these trios are each 750 lb. of butter—there is a great difference in their values.

No. 1 shows that the breed is being improved every generation, whereas No. 2 indicates that it is stationary. The remarks already stated regarding the giving of prizes for individual members of a herd apply in this case also.

It would be far better, instead of taking a single trio, to make such a competition also for the herd, or, at any rate, a certain percentage of it.

Encouraging the building up of the herd *as a whole* should do more good to the industry than the giving of substantial prizes for the forced performances of its individual members. A good herd generally contains some very high yielding individuals.

While on the subject of recognising test records taken over a lengthy period, I would like to point out the advisability of altering, wherever we have sufficient records to make it possible, the system at present in vogue throughout New South Wales. I allude to the judging of dairy stock on *appearance and type alone.* The error of this is already well known. The winner of innumerable blue ribbons need not necessarily be a good butter-producer, or capable of passing on to its progeny high milk and butter yielding qualities.

During the short time Herd-testing Associations have been operating on the Tweed-Richmond area, dairy cows who have won first prizes at the various district shows have been proved to be valueless as butter producers. In one instance, I know of a much be-ribboned animal having been set apart for the butcher, and, with her, several of her offspring, who, like their mother, were giving a good quantity of milk, but containing very little butter fat. A calf of this strain was being kept by the owner to serve as a sire in the herd, but, on finding out the actual performances of its mother and sisters as commercial dairy cows, he changed his purpose. Other instances have come to my knowledge where prize-winning bulls in Agricultural Societies' competitions are of no value when judged by what their rogeny yield at the bucket.

Is not the time ripe for some change? I would suggest that consideration be given by Agricultural Societies to, where possible, judge dairy stock—male and female—not only on their appearance and type, but on their milk and butter producing records. This is now generally done in Denmark. A sire should show the records of his mother, sisters, and, if of sufficient age, his progeny. The females should likewise show what they are capable of yielding themselves and, where possible, what their heifers have accomplished. In the case of young heifers, what their mothers have done in conjunction with the performances on the sire's side.

In the dairy stock section, I take it that nobody desires to foster the breeding of pretty toys, no matter how true to type they may be, or no matter how beautiful their formation!

The best cow in a milking herd may not be the best looking.

The dairy farmer rightly judges her to be his best cow who yields the most at the bucket and is capable of transmitting such milk and butter producing qualities to her offspring. The same applies to the sire. His value is his ability to stamp high butter producing characteristics on his descendants.

Acting on the suggestions tendered, the Tweed River Agricultural Society took the matter up, and last year gave liberal prizes for the best yielding herds in the district. To the Tweed Society belongs the credit of being the first to give recognition to the value of tests taken from a herd over a lengthy period—as also they are the first to take advantage of the valuable work being done by the district Herd-testing Associations. In this respect the Tweed Society is an educator and lives up to its vocation. It is progressive.

Conditions of the Competition.

Tweed River Agricultural Society's Competition for best yielding herd in any registered Herd-testing Association affiliated with the Tweed-Richmond Herd-testing Council.

Regulations governing the Competition.

(1) Minimum number of cows in a herd to be forty.
(2) Not less than 60 per cent. of the herd to have been tested.
(3) Cows eligible and that shall compete are those having had records taken six times during the months of March to September inclusive, unless as prescribed in the following clause.
(4) Any cow's records for a lesser period than six months exceeding those for six months shall be substituted therefor.
(5) No herd shall be eligible unless at least twenty cows qualify in terms of Clauses Nos. 3 and 4.
(6) The first, second, third, and fourth prizes shall be awarded the owners of the herds showing the highest average yield of butter per cow in their respective order. (In this case, the owners are the various Herd-testing Associations making the entries.)
(7) The three best cows from each of the first, second, and third prize-winning herds to be exhibited on the Society's Show Ground each day from 10 a.m. to 4 p.m. (otherwise the prizes shall be forfeited), unless prevented by tick regulations, or other satisfactory reason for such absence be given.

The Agricultural Society, while offering £30 in prizes, stipulated that at least ten entries be made before the 30th September, or no prize would be awarded and entrance fees returned. The entrance fees were:—Fo members, 15s.; for non-members, 21s.

The various Herd-testing Associations entered their best herds, thus making it an inter-district competition.

The general secretary of the Herd-testing Council computed the yields of each herd in the competing associations, and supplied the secretary of the Tweed Agricultural Society with the results. Individual members of any Testing Association were not aware of the results of their herds until notified—in the case of the winners by the Agricultural Society, in the case of the others by the secretary of their association—who in turn got the information from the Council's general secretary.

The associations paid the entrance fees, and the prize-money was utilised towards paying the expenses of testing in the winning district. The owners of the winning herds were presented with a framed certificate. By this means the personal element was eliminated. The competition, being an inter-district one, created great interest. In drawing up the regulations governing the competition the fact that many of the associations did not commence testing until after the New Year made it impossible to take any other period than the one utilised—though this meant that the major portion of such period comprised the winter months. This makes the high average yields of the winners all the more meritorious.

The Tweed Agricultural Society's officials are so well pleased with the result of their initial effort that they intend to include a similar competition in this year's programme. The regulations for this will be revised and improved.

Messrs. J. T. Young, Kenneth Mitchell, and A. W. Hinwood were the Tweed–Richmond Herd-testing Council's sub-committee appointed to draw up last year's rules for submission to the Tweed Agricultural Society, and the same gentlemen have been again deputed to perform this task for the current year.

There is a likelihood of other district Agricultural Societies following the example set by the Tweed.

When framing Clauses 3 and 4 to govern last year's competition it had to be taken into consideration that no records were available from the Herd-testing Council prior to the 1st March, 1913, leaving a period of seven months to 30th September upon which to operate. A list was prepared from each herd of all the cows having six records, either March to August inclusive, or April to September inclusive. The number of cows having these six records determined the number to qualify, and which had to compete, *e.g.*, Herd A, seventy cows, forty of which had six records—number to compete, forty—in terms of regulation No. 3.

A further list was then prepared of cows having less than six records, and if any of these exceeded the total yields of the cows having six they were substituted therefor—the number to compete remaining at forty (*vide* reg. No. 4). The results were then worked out to determine the average for the forty cows for the period under review.

Summary of Results.

Name of Association.	Member	Type of Cows in Herd.	Type of Bulls in Herd.	Average lb. of butter yielded in six months
Burringbar ...	Mitchell, K. ..	Jersey and grade Jersey	Jersey.	173·6
	Ewing, F. P. ...	Guernsey and grade Guernsey.	Guernsey.	160·7
	Stoker, R. W...	Shorthorn grade.	Durham.	155·6
	Carthy, L. J. ...	Durham, Ayrshire, Guernsey } crosses.	2 years ago, Ayrshire, now Guernsey,	144·7
Byron Bay ...	Young, J. T. ...	Illawarra Milking Shorthorn.	Milking Shorthorn.	199·1
	Dudgeon, W. H.	do	do	195·3
	Smith, L. J. O.	Grade Shorthorn.	do	184·9
	Hinwood, A. W.	do do	do	172·4
	Elliott, D. A. .	Pure and grade Illawarra Shorthorn.	do	170·3
Crystal Creek	Connor, T. A. ..	Jersey and grade Jersey	Jersey	180·5
	Roche, E. B. ...	Grade Shorthorn.	Durham	133·9
Condong ...	Anderson, J ..	Grade Shorthorn. ,, Jersey.	2 years ago Milking Shorthorn, now Jersey.	177·6
	Reynolds, R. ...	Grade Shorthorn.	Durham.	151·6
	Hartigan, D. ...	do do	do	148·9
Uki	Buchanan, I. G.	do do	do	145·3
	King, I. B. ...	Ineligible, records incomplete.		
Mullumbimby..	.. ..	Five entries, ineligible, records incomplete.		

Total number of entries :—Twenty-one.

Order of Merit.

Name	Association.	Butter.
First :—Young, J. T. . ..	Byron Bay Herd-testing Association	199·1
Second :—Dudgeon, W. H.	do do	195·3
Third :—Smith, L. J. O	do do	184·9
Fourth .—Connor, T. A . .	Crystal Creek.	180·5

By way of illustration the following is a table of the four winning herds showing how results were arrived at. Each and every herd was treated in a similar manner, and in no instance did any one herd gain an advantage over another.

Name of Winner.	No. of Cows.		To qualify with six consecutive tests.	Lb. of butter yielded in six months.	
	Testing in herd.	Substituted under Cl. 4.		Total.	Average per head.
Young, J. T. .. .	52	8	24	4780·2	199·1
Dudgeon, W. H.	118	17	47	9181·1	195·3
Smith, L. J. O.	42	4	21	3884·8	184·9
Connor, T. A.	124	8	36	6501·3	180·5

Most of the cows were due to calve in early spring, hence the number to qualify with six consecutive tests was low.

The Winning Herd.

Mr. J. T. Young, the owner of the winning herd, is a well-known breeder of Illawarra Milking Shorthorns. Formerly he was in partnership with Mr. Dudgeon, but now they each run their own establishment—though they are both using the same strain. Mr. Young's farm of 160 acres is situated near the railway line, a little over a mile on the Binna Burra side of Bangalow—in the heart of the famous Big Scrub. The country is slightly undulating with rich flats. The soil is red volcanic. A beautiful creek of clear fresh running water flows through the property. Thirty acres are cultivated to provide green fodder for the stock during times of scarcity. The kinds grown last year were:—Oats and rye grass, rye corn, maize, sorghum, and cow cane. The milkers were fed on these during a portion of the period covered by the competition. The balance of the farm is pasture land laid down with paspalum and clover.

The farm is subdivided into small paddocks, the 160 acres being cut up into twenty-two fields.

Mr. Young is a great believer in subdividing into small areas, continually changing the stock from one paddock to another at short intervals: thus the animals have always fresh grass to feed on. Also a certain number of paddocks can always be spelling, thus enabling the paspalum to get a chance of growing properly.

Mr. A. E. Brown, of Ingleside, the well-known Jersey breeder, holds similar views to Mr. Young on these points—none of his paddocks exceed 15 acres. It is worthy of note that during the past summer, which was the driest on record for the Big Scrub country, while the paddocks of their neighbours were entirely bare of grass, these two gentlemen had feed for their cows.

The total number of stock grazing on Mr. Young's farm of 160 acres last year was 124 comprising:—

Milkers	56
Dry stock other than calves ...	29
Calves under twelve months ...	25
Horses	8
Bullocks	6

To carry, without loss, such a large number, through a severe season like the one we have just passed through, speaks well for Mr. Young's farm and the system by which he manages it.

Mr. Young has always used a pure Illawarra Milking Shorthorn bull. Reform, from which he has been breeding for the past six years, was bred by Mr. H. Dudgeon, Jamberoo. He is by Gentle's Prince out of Jenny. Gentle's Prince is by Red Prince out of Gentle. Jenny was by Mr. H. Dudgeon's celebrated bull Charmer. On both sides Reform is bred direct from Major (imp.).

To mate with Reform's progeny a young bull from the Scottish Investment Company's Darbalara Estate was procured. He is by Emblem from Lily III, nd is thus a half-brother to the one recently purchased by the New South

Group of six best cows in Mr. J. T. Young's herd First in Order of Merit.

Group of six best cows in Mr. W. H. Dudgeon's herd. Second in Order of Merit.

Group of five best cows in Mr. L J. O. Smith's herd. Third in Order of Merit.

HERD-TESTING ON THE NORTH COAST. WINNERS IN THE TWEED RIVER AGRICULTURAL SOCIETY'S COMPETITION.

Wales Government from the same breeders. Lily III's record last year, under the United Pure-Breeders Association's Testing Scheme carried out by Government officials was 14,742 lb. of milk yielding 580 lb. of butter in 273 days. On the last day of the test she gave 37·5 lb. of milk yielding 1·5 lb. of butter.

The annual return in butter from the whole of Mr. Young's herd, last year, was 17,356 lb., equal to £708 5s. 9d. Pigs brought in £128 13s. 9d., making a revenue of £836 19s. 6d. from these two sources, without counting sales of young dairy stock. This represents a return of about £5 4s. 6d. per acre.

When considering this return it must be borne in mind that during the twelve months under review the North Coast experienced the worst season on record. During the first half of the year it was continually raining—over 80 inches being recorded up to 30th June. This made the pastures very sour. The winter was bleak and wet, cutting up the stock, and affecting their yields considerably. Then on top of this, the spring and summer were extremely dry—very little rain falling after August. Hot winds burnt off the grasses. The whole countryside was changed from its usual verdant aspect, and drought conditions prevailed.

Under such circumstances, such a return as the one given above must be considered as very good indeed. Given a better season, one cannot doubt that it would be greatly increased.

Asked his opinion of the value of testing cows regularly for butter-fat yields, Mr. Young states that, to his mind, "Herd-testing is an essential to ensure a maximum of success in dairying. The dairyman who does not adopt it will certainly be 'left.'" He goes on to say, "During the past sixteen years, I have used the 'Babcock' on my cows, but not in the systematic manner followed by the Herd-testing Associations. My custom was to test spasmodically, once or twice a year. The result of my first year's testing in the Byron Bay Herd-testing Association, came as a surprise to me, proving as it did that irregular testing, as previously carried out by us, was most misleading. I was, indeed, astonished to find that, in spite of previous culling out, I had such a 'tail-end' to my herd. Needless to say, I intend to lop it off as soon as possible. In fact, I have already culled out and speyed nine of my worst producers. These go to the butcher as soon as possible. What a great benefit it is to the dairyman to know which are the best mothers from which to keep heifers to build up his herd by replacing the tail-enders culled out."

Coming from Mr. Young, such a statement speaks volumes for the value and efficiency of the Herd-testing Scheme organised by the Department of Agriculture on the Tweed and Richmond Rivers.

I am indebted to Mr. A. W. Hinwood, General Secretary of the Tweed-Richmond Herd-testing Council, for details of the yields of the various herds entered for the Tweed Agricultural Society's competition.

It is worthy of special note that not only in the four winning herds but in all those mentioned as leading in their respective districts, *pure-bred sires are used by the owners.* Those who prefer to use grade-bulls, would do well to note this fact.

The Winning Herd.

	Best Five Cows.					Worst Five Cows				
Cow's Number	42.	22.	9.	14.	34	32.	33.	21.	37.	27.
1913.										
Lb. of Milk for Month of — March	.	1,095	1,170	1,050	1,050	420	420	555	540	570
April	..	900	1,050	960	960	360	360	480	645	510
May	..	960	1,050	870	990	330	285	435	570	450
June	1,725	1,050	1,080	840	870	255	240	450	390	360
July	1,515	900	870	705	780	150	150	320	345	330
August	1,680	915	705	630	555	180	150	270	300	270
September	1,380	...	..	.	. .		. .	..		...
Total for Period	6,300	5,820	5,925	5,055	5,205	1,695	1,605	2,510	2,790	2,490
Lb. of Butter for Month of — March	...	53·7	51·9	46·5	54·0	24·6	36·0	24·3	25·2	28·2
April	..	44·4	48·9	51·6	48·3	22·8	28·8	23·7	25·2	27·6
May	..	47·1	46·5	44·7	51·0	16·2	26·4	19·2	24·6	23·1
June	101·4	55·5	49·2	41·4	40·5	13·2	22·8	22·5	16·2	18·9
July	78·3	42·0	39·6	40·5	39·3	5·4	15·9	16·8	15·9	18·0
August	82·5	45·0	32·7	37·2	26·4	8·4	11·1	12·6	12·9	13·8
September	64·2	. .	. .	..		...	...	.		
Total for Period	326·4	287·7	268·8	261·9	259·5	90·6	141·0	119·1	120·0	129·6
Dates of Calving	12 May, 1913.	11 February, 1913.	20 February, 1913.	24 February, 1913.	13 March, 1913.	7 September, 1911.	12 October, 1911.	6 February, 1912.	24 March, 1913.	12 October, 1912.

Numbers 37 and 27 are both heifers on first calf.

Number 37 has lost one-quarter of her udder through barb-wire accident.

Numbers 32, 33, and 21, through failure to breed for a considerable time (*vide* date of last calving), are not yielding up to their usual form.

*Number 42 is the best cow in the herd by far. On account of the dry season, she was dried off early. She was due to calve again at the end of March.

At the end of six months' lactation period she had yielded { 8,910 lb. milk. 452·7 lb. butter.

At the end of eight months' lactation period she had yielded { 9,840 lb. milk. 498·6 lb. butter.

Computing butter at 9d. per lb. :—

	£	s.	d.
Return of best five cows...	52	13	2
Return of worst five cows	22	10	2
The best cow's return (4 months) ...	12	4	8
The lowest cow's return (6 months) ...	3	8	0

* Cow 42 dropped a fine big pair of twins, a bull and a heifer, on 7th April. As her last calf was born on 9th May, this totals 3 calves in 11 months, and makes her last year's milking performance all the more meritorious.

The five best cows averaged 280·86 lb. of butter, which, at 9d. per lb., was equal to £10 10s. 6d. each for the six months.

The five lowest averaged 120 lb., or £4 10s. each for the same period.

It would be desirable to see within a few years such dairy stock shows held at the various centres on the Tweed and Richmond where production records would form the basis of all judging. This could be done with the Herd-testing Associations of the Tweed-Richmond Rivers working in co-operation with the various district Agricultural Societies. Each succeeding year this exhibition could be held at a different centre—Murwillumbah, Mullumbimby, Bangalow, and Lismore taking it in turns. By this means there could be inaugurated a series of exhibitions representing the North Coast as a whole.

The Herd-testing Council could furnish records of yields in milk and butter over given periods, so that it could be made compulsory for all entries in the various classes to be accompanied by each animal's production and that of its immediate ancestors—also of its descendants, if any. It would be an honour to win a prize in such a show-ring where judging was based on actual facts, not on individual opinions, which are often at variance.

Such judging as that recommended should be conducted on points—the maximum being given for productiveness in milk and butter—constitution, type, and general appearance coming next.

The judging of dairy stock can be summed up in these words of Socrates, as recorded by Xenophon in "The Memorabilia":—"Whatever is good is also beautiful in regard to purposes for which it is well adapted, and whatever is bad is the reverse of beautiful in regard to purposes for which it is ill adapted." *Performance* comes before *appearance*.

The writer is indebted to Mr. F. Radford, of Lismore, for the use of the photos from which the accompanying blocks have been made.

Cow No. 42.—The property of Mr. J. T. Young, Bangalow. Yielded 8,910 lb. milk and 452·7 lb. butter in six months.

Attractive Rural Homes.

No. 8.—Mr. James Packham, Garra.

IN the *Agricultural Gazette* for May, 1912, illustrations were given of a house at Manilla, of which it was said "the home has more the appearance of a suburban villa than of a farmer's residence as the latter term is too commonly understood."

At that time Mr. Packham, who has a wheat farm of 360 acres at Cherry Hill, Garra, was contemplating the building of a new residence, and considered that of all the plans given in the *Gazette* that of Mr. McDonald, at Manilla, most closely conformed to his notions of comfort and attractiveness. He, however, decided upon certain minor modifications, and a fair idea of the result may be gathered from the illustrations here given.

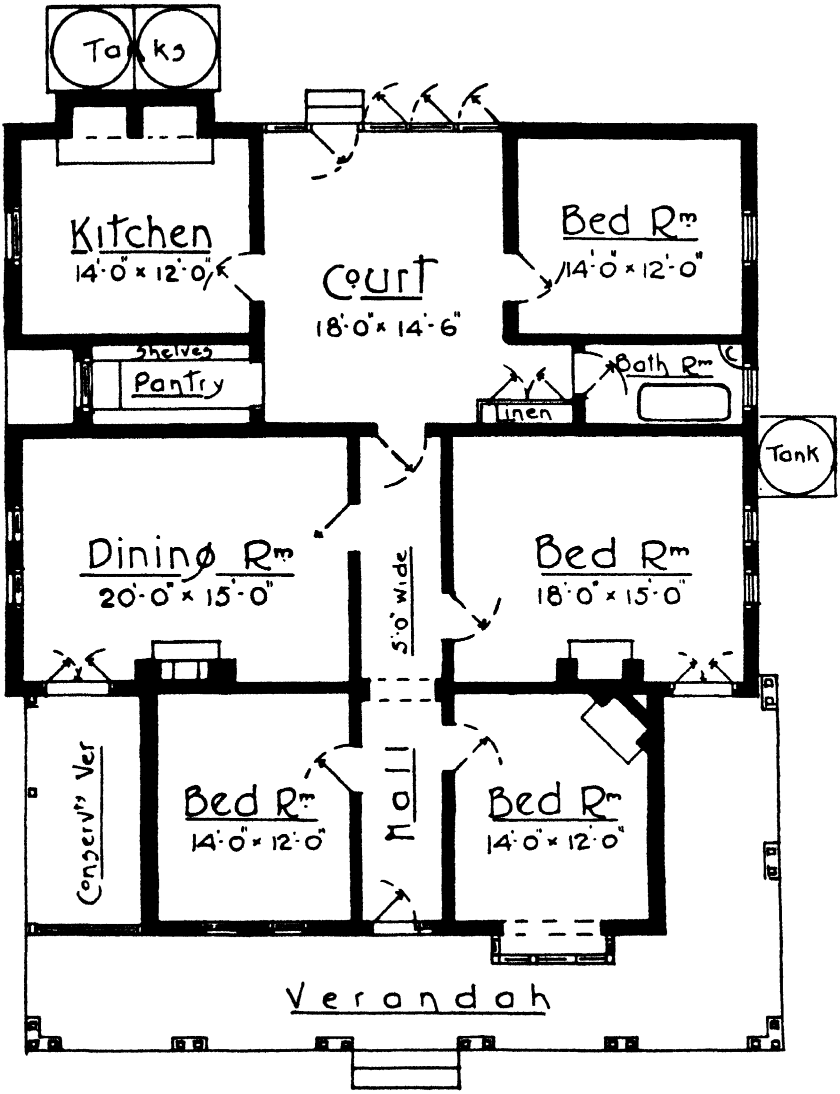
Mr. James Packham's Residence at Garra.

The materials used were cement concrete blocks made on the site, as suitable sand for this purpose was available about a mile distant. The dimensions of these blocks were 24 in. x 8 in. x 8 in., and the cost was about a quarter less than that of bricks, although these could be obtained about 7 miles away at Molong.

The internal partitions are of smooth concrete blocks 6 inches thick, plastered on the inside.

Mr. Packham has evidently built with a view to permanence, and his experience of the house so far fully complies with all his anticipations.

He may be congratulated on the possession of an attractive, commodious, and substantially built home, which may well serve as an object-lesson to other farmers intending to build.



PLAN OF NEW HOMESTEAD
at GARRA for Mr JAMES PACKHAM

Exports and Cold Storage.

H. V. JACKSON

Rabbits and Hares.

THE quantities of rabbits and hares packed and frozen in New South Wales during the year ending 31st December, 1913, were as follow :—

RABBITS.

January to June, 1913	354,865	crates.
July to December, ,, ...	209,975	,,
Total	564,840	crates.

The above number of crates equals 13,556,160 single rabbits.

HARES.

January to June, 1913	26	crates.
July to December ,, ...	80	,,
Total	106	crates.

The quantity of rabbits and hares exported was 6,940,965 pairs, valued at £373,633.

The rabbit and hare skins exported amounted to the value of £310,694.

The value of frozen rabbits and hares, and of skins exported, totalled for 1913 the sum of £684,327.

FREEZING WORKS in Operation Packing and Freezing Rabbits.

Fresh Food & Ice Co., Limited, Sydney.
Metropolitan Ice Co., Limited, Sydney.
Sydney Ice Skating Rink and Cold Storage Co., Limited, Sydney.
Country Freezing Co., Limited, Harden, Dubbo, Warrigal, Blayney, Young, Gunnedah, Orange.
Bungendore Freezing Co., Limited, Bungendore.
Braidwood Freezing Co., Limited, Braidwood.
Crookwell Freezing Co., Limited, Crookwell.
Dunedoo Refrigerating Co., Limited, Dunedoo.
Lachlan Freezing Co., Limited, Cowra.
J. Moore, Camden.
Mudgee Freezing Works (O'Brien Bros.), Mudgee.
G. J. Rohr, Wagga.
Rylstone Freezing Works, Rylstone.
W. White, Limited, Tumut, Germanton, Cootamundra.
Wilson & Flood, Bathurst.

Poultry and Eggs.

It is estimated that 476,312 dozen eggs were held in cool stores during the season 1913–14. In addition there were also stored 9,802 tins of pulped eggs, of 40 dozen each, making a total of 868,392 dozen eggs held in cool rooms.

The following are the figures for the past sixteen years :—

1898	...	11,000 dozen.	1906–7	...	150,322 dozen.
1899	...	93,000 „	1907–8	..	250,000 „
1900	...	96,000 „	1908–9	...	305,044 „
1901	.	140,272 „	1909–10	...	329,976 „
1902–3	...	130,524 „	1910–11	...	420,372 „
1903–4	...	151,128 „	1911–12	...	564,372 „
1904–5	...	253,908 „	1912–13	..	444,996 „
1905–6	...	288,648 „	1913–14	..	476,312 „

Estimated Live Poultry on Farms and Holdings of 1 acre and upwards.

At end of Year.	Fowls.	Ducks	Geese.	Turkeys.	Other.	Estimated Number of Eggs obtained during Year.
	No.	No.	No.	No.	No.	doz.
1908	2,721,986	229,870	25,631	173,613	24,514	11,305,299
1909	2,672,385	257,741	25,878	224,187	36 000	12,096,859
1910	3,072,375	315,550	28,980	244,456	35,015	13,204,906
1911	3,213,200	321,400	26,200	232,500	4,600	13,637,000
1912	3,351,600	261,100	23,900	216,300	6,000	13,769,000

It will be seen that from the year 1908 to 1912 the poultry on holdings of one acre and over increased by over 660,000 head, and eggs by over 2,400,000 dozen. The increase, it is believed, has been proportionately large on areas under one acre.

Exports.

Quantity of Produce inspected under the Commerce Act during 1913.

Description	January to June	July to December.	Total.
	Packages.	Packages.	Packages.
Canned Fruit	1,853	2,765	4,618
Fruit	29,616	72,316	101,932
Honey . ..	137	29	166
Jam	2,168	2,407	4,575
Leather	6,443	7,430	13,873
Maize	61	1,477	1,538
Millet	34	23	57
Plants	274	371	645
Potatoes	12,401	10,390	22,791
Seeds	3,128	3,767	6,895
Hares	283	235	518
Rabbits	149,436	439,872	589,308
	205,834	541,082	746,916

QUANTITY OF PLANTS inspected under the Quarantine Act (Plants), during 1913.

Description.	January to June.	July to December.	Total.
Bananas (bunches)	342,357	231,190	573,547
Bananas and Pines (cases) ..	9,276	12,375	21,651
Fruit (centals)	29,345½	98,061½	127,407
Cereals, Pulse, and Seeds (centals)	368,198	212,105	580,303
Vegetables, Corms, Bulbs (centals)	10,444	30,580	41,024
Nuts and Nutmegs (centals) ..	12,915	9,709	22,624
Plants (number)	123,704	5,573	129,277

PRINCIPAL ARTICLES exported Oversea, 1913.

	Value. £
Animals	54,098
Butter	988,143
Coal	1,120,167
Copper, ingots	1,977,344
Fruits—Fresh	36,206
Gold...	1,335,763
Grain—Wheat	2,723,209
Flour	509,961
Lead	1,639,652
Leather	369,210
Meats—Beef	247,934
Mutton and Lamb	1,215,878
Rabbits and Hares	373,633
Preserved	575,855
Oil—Cocoanut	85,547
Ores—Spelter, &c.	1,211,289
Silver—Bullion	310,033
Skins—Hides	910,609
Sheep	439,525
Rabbit and Hare	310,694
Other	612,812
Tallow	1,002,076
Timber	277,223
Tin, ingots	407,381
Wine	18,718
Wool	11,699,858
Other articles	2,389,971
Total	£32,842,789

The Hymenomycetes of New South Wales.

J. B. CLELAND, M.D., Principal Government Microbiologist, and E. CHEEL, Botanical Assistant, Botanic Gardens

MOST of the large fleshy or woody fungi so common on the ground or on wood in the autumn belong to the order Basidiomycetes. The order is divided into two primary groups—the Hymenomycetes, in which the spore-bearing surface (Hymenium) is exposed from the first, and the Gastromycetes, in which it is enclosed in a continuous membrane, as in the puff-balls, until the spores are mature. The Hymenomycetes are again divided up into families, according to the grosser nature of the structures which support the hymenium. Following the classification of Massee these families are as follows:—

Family *Agaricineæ*—Hymenium borne on lamellæ or gills.

Family *Polyporeæ*—Hymenium borne on the inside of tubes or pits.

Family *Hydnaceæ*—Hymenium borne on the surface of spines or warts.

Family *Thelephoreæ*—Surface of hymenium smooth; fungus incrusting or when erect, tough and dry, or leathery.

Family *Clavariaceæ*—Hymenium smooth; fungus erect, club-shaped or much branched, fleshy, and brittle.

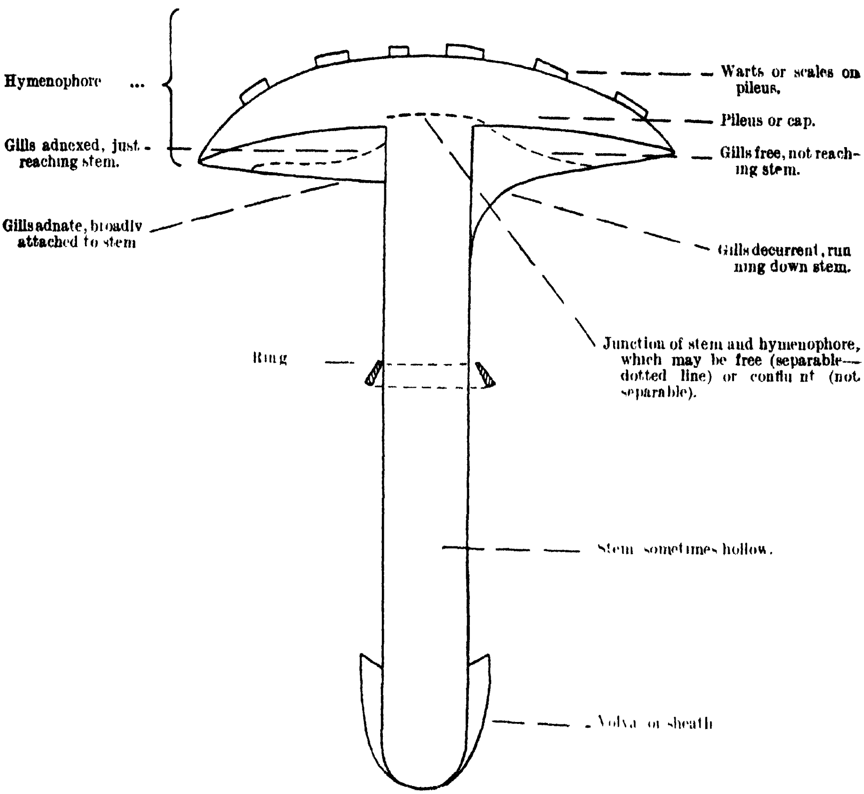
Family *Tremellaceæ*—Hymenium smooth, substance of fungus gelatinous when moist, rigid and horny when dry.

Family Agaricineæ.

One of the most difficult of botanical studies is the identification of the numerous members of the family of fungi known as the *Agaricineæ*, which includes our common mushroom and most of the large and often showy toadstools. For many years the authors of this paper have independently paid attention to this group, but have been much hampered by the difficulties attendant on the subject, more especially the imperfect descriptions of many Australian species and the paucity of coloured illustrations of the kinds indigenous to Australia. To this must be added the fact that most of the fleshy forms cannot be preserved in a way which gives an adequate idea of their original appearance. Full notes have to be made at the time of collecting, and circumstances often render these incomplete. Having joined forces for mutual assistance, however, the authors have seriously set to work to record as far as possible, by illustration as well as by description, the various species found in this State. As coloured illustrations will, it is hoped, prove a feature of this account, and be of service to agriculturists,

nature students, and others whose interest may be aroused, we take this opportunity of appreciating the work of those who have so materially aided us in our self-imposed task.

In discussing the subject of these agarics, it may be, first of all, pointed out that there are very important economic aspects to be considered, which will receive due weight in these notes. Though many kinds may be dismissed as being probably neither injurious nor useful to man, their consideration must not hastily be dispensed with scientifically, as they may serve a useful



DIAGRAMMATIC REPRESENTATION OF A SECTION OF AN AGARIC.

purpose in explaining obscure points in connection with other forms. As regards edible kinds—and here many useful and delicate additions to the table are now passed by unheeded the common mushroom and its forms are alone popularly known in this State. Poisonous and unpleasant kinds may easily be mistaken for these, and we shall endeavour to show how such mistakes can be avoided. But there are a large number of other edible kinds, many of which will well repay our attention. In a number of instances, the general appearance of these does not in the slightest degree suggest that they are edible. Of the effects of poisonous kinds—and some contain very powerful poisons—but few records occur in Australia as regards man. They may,

however, explain some unexpected deaths in animals which, from time to time, have come under notice. It is at least well that the agriculturist should have some handy means of reference, so that in any case in which such a cause of death may be suspected, he may be able to refer to figures of recorded poisonous species and see whether any of these can be found in the neighbourhood. Other species play an important economic rôle, the honey-fungus (*Armillaria mellea*), for instance, being a destructive parasite on fruit trees. A number of other kinds, by means of their mycelium (or fungus threads), penetrate timber and destroy it by a process of rotting, the fruiting of the fungus occasionally appearing as a crop of toadstools on or near the wood. Still other fungi may injuriously affect pastures, as happens with some of the "fairy rings," the mycelium preventing access of water to the roots of grass, with consequent deficiency of growth. These various aspects will be dealt with more fully later on.

With a view to aiding the student to study these plants, as well as to afford a guide to those who may wish to make use of the edible species, it is hoped that the accompanying key to the genera, as well as the descriptions of species and general information concerning them, will be found of some service in that direction.

It is known that certain species of the genus *Amanita* contain a deadly poisonous principle, and that there are also a few species of the genera *Lepiota* and *Clitocybe*, which, although not so dangerously poisonous as the *Amanitas*, may be violently emetic in their action upon some people. In view of this knowledge, it therefore becomes an important question how to distinguish the edible kinds from the poisonous or injurious species. It is generally supposed that the edible kinds are mushrooms and that the dangerous kinds are toadstools, but there is no real distinction between mushrooms and the so-called toadstools in their general characters and structure.

How to Distinguish the Edible from Poisonous or Deleterious Species.

At the outset, it may be stated that there are no hard and fast lines distinguishing the harmless from the hurtful kinds. All that can be said in general is that the darker the spores the less likelihood of danger, and the chief safeguard in distinguishing the edible from the poisonous or deleterious species of agarics is to become acquainted with the well-defined features of those species already recommended by the workers who have made a special study of fungi. There is no difficulty in recognising all the best kinds by means of ordinary intelligence and care, and, when once certain species are known by any given peculiarities of structure which distinguish them from all others, there is no fear of error. Good kinds have usually a pleasant odour, somewhat resembling new meal or a faint scent of anise. If a fragment is broken off from a freshly-gathered agaric, and tasted, it should possess an agreeable nutty flavour, with no acidity, sharpness, or tingling sensation upon the tongue. Those species with a disagreeable odour or sharp acid taste should studiously be avoided.

The Life History of Agaricineæ.

In studying the *Agaricineæ* it is important to know something about the life history of the plants, with their peculiar mode of development and final production of a crop of spores for future generations.

The commencement of life of the mushroom is similar to that of all other kinds of fungi, and is developed from a single spore, which is analogous to the seed of an ordinary flowering plant, and like it commences growth by germination as soon as suitable conditions exist.

The germ-spore develops a very delicate microscopic filament which bursts through the outer coat or covering of the spore, and as soon as a suitable substratum or food is found the filament commences to branch and ramify in various directions to eventually produce a string or dense weft or mass of irregular branching hyphæ, forming the mycelium which assumes a definite colour according to the particular species. In some species the mycelium is white, while in others it is creamy, yellow, or various shades of brown or nearly black.

The individual strands of hyphæ are cylindrical, with rounded free ends, and are more or less interspaced with transverse partitions known as septa. Sometimes the hyphæ are encrusted with numerous rod-like crystals.

As soon as the mycelium, which in reality is the vegetative stage of the fungus, reaches its fullest development, it will be seen upon examination that there are a number of tiny globular or oblong bodies attached to the strands of the mycelial hyphæ, or so-called spawn. These are the fruit or spore-bearing bodies, which develop very rapidly, and eventually push their way through the soil and finally expand into a perfectly developed mushroom.

If one of these is examined during the early stage before it reaches the surface of the ground, it will be found that the cap and stalk is protected by a delicate membrane or wrapper-like covering which is torn as the cap expands, to disappear altogether in some species, whilst in others there are some remnants left on the cap In a few, which have a thick wrapper-like covering, the membrane forms a definite cup at the base of the stalk, which is called a volva. In addition to the outer covering there is in many species an inner membrane which in some cases somewhat resembles a cobweb-like veil, while in other genera it forms a thin skin, part of which often remains as a ring on the stem, or as a fringe hanging from the margin of the cap or pileus.

The cap or pileus assumes various shapes—in some genera somewhat resembling a bell, while in others it resembles a parasol, or may be deeply impressed, inverted, or resupinate in a few. In the centre of the cap is the stem, or in a few genera the stem may be lateral or entirely wanting. On the under side of the cap are the gills or lamellæ, which radiate from the stem to the edge of the cap and support the hymenium or spore-bearing surface.

The individual spores are borne on slender and delicate microscopic supports called sterigmata, which are attached to more or less club-shaped cells called basidia, and when fully matured fall off and appear as a very fine

powder, easily seen by the naked eye if the stem is removed from the cap and the cap placed gills downwards on a clean sheet of paper.

If it is required to study the structures of an agaric more minutely, by means of sections, it is of great advantage to harden the material, and the following treatment has been found to produce good results:—Treat the freshly-gathered material for about twenty-four hours with 1 to ·5 per cent. of chromic acid; wash with water, and then successively with 50, 70, and 90 per cent. methylated spirit; the tissues will then assume a cartilaginous character, which makes it possible to cut fine sections; in preparing large specimens, it is an advantage to cut them up into pieces of moderate size, so that the reagents may gain more ready access to the internal parts.

From material thus treated, cut longitudinal sections of the stem, so as to include both peripheral and central tissues; mount in glycerine, and examine first with a low-power objective, which will show the whole tissue composed of elongated septate tubes, known as hyphæ, closely interwoven.

Agarics with Cystidia.

A number of species of agarics have minute structures known as *cystidia.* These may be seen with an ordinary pocket lens on examination of the gills of *Coprinus atramentarius.*

They are minute bodies, somewhat inflated and quite transparent, and project slightly beyond the basidia and paraphyses of the hymenium. At certain stages of development they are particularly interesting, as they have a glistening appearance. The function of these bodies is not yet fully understood.

Phosphorescent Agarics.

In the coastal districts of this State one frequently finds a cluster of agarics which give a soft light during the dark nights of April and May. The light is quite strong enough to enable one to read the head-lines of an ordinary newspaper. The most familiar species of this kind is *Pleurotus candescens.* It is a large fleshy agaric, with a slimy concave surface, and is usually found at the base of eucalyptus trees, and may be seen at a considerable distance during a dark night.

Many theories have been advanced as to the cause of this luminosity.*

Preservation of Agarics.

Owing to the fleshy nature of agarics, it is somewhat difficult to preserve the specimens in herbaria, so as to show their shape as they are found in nature. Several species are deliquescent and, unless collected in their very early stage, collapse before the collector can reach home.

In such cases all frail or deliquescent species are best preserved in an alcohol-formalin mixture, containing 4 per cent. of formalin.

* See McAlpine, Proc. Linn. Soc. N.S.W., xxv (1900), p. 548; and Baker, Proc. Lin. Soc. N.S.W. (1899), p. 446; Drummond in Hook. Journ. Bot., 1842-43; Zopf., Die Pilz, page 195 (1890).

To prepare specimens of the tougher kinds for the herbarium, the following method is recommended:—

Take a sharp knife with a thin blade, and cut an agaric perpendicularly from the cap downwards, right through the centre of the stem; then a second cut will remove a thin section. Place this on ordinary folded herbarium paper, and place between blotting-paper to soak up the moisture. Very little pressure is needed, and care is required when changing the paper, so as to prevent the sections from moving from the paper.

When the specimen is dry, it will be noted that an impression is made on the paper. This can be outlined with a pencil on removal of the specimen, so that a general idea is given of the shape of the living plant, in addition to the retention of the dried specimen itself. If the specimen adheres closely to the paper, it is best not to interfere with it, but to leave it there.

From the remainder of the specimens not cut up into sections, the gills can be carefully removed and dried in the sun without pressure, and then put into packets for microscopic examination. The other portions can also be preserved, if necessary; but careful notes as to the length, thickness, or other particulars—such as scales, colour, &c.—should be made.

We have ourselves had considerable success in retaining the shape and colour of many fleshy kinds by rapidly drying them in an incubator, such as that used for bacteriological purposes or one used for raising chickens. In moist weather, proximity to a fire aids the drying process.

Spore Prints.

It is advisable to secure spore prints of as many species as possible, and those may be obtained by placing the specimens, gills downwards, on white or black paper, according to the colour of the spores.

A Systematic Key.

In the following key an attempt has been made to define the most conspicuous and permanent characters of each genus so as to enable the beginner to distinguish the numerous forms, and place a given specimen in its proper systematic position. This can only be done by carefully examining the structure of the stem, gills, and cap, and carefully noting the colour of the spores, which usually impart the same colour to the gills.

It must be borne in mind, however, that the colour of the gills in some species is changeable. Thus, for example, in the common or true mushroom, *Psalliota campestris*, it will be noted that in the early stage the gills are white, then pink, and finally turn a rich purplish-brown when they are properly mature. In the same way we find that the gills of the "shaggy mane" (*Coprinus comatus*) are white at first, then pinkish, and finally turn black, and then are deliquescent.

It will be gathered from these two examples quoted, that the specimens must be examined when they are fully matured, and when one becomes

familiar with the characters in the different stages of development there should be no difficulty in placing them in their proper sections or genera. It will require some experience to be able to work out the numerous species, especially those that are not common, but there should be no difficulty in fixing those that are most common, by examining them for secondary characters, and comparing them with the descriptions given in the text.

The colour of the spores forms a primary basis for classification, by which the species may be divided into five distinct classes or series. In most cases the colour of the gills is the same as that of the spores, but in a few instances it is advisable to remove the cap from the stalk and lay the gills downwards on the paper, when an impression of the gills may be obtained, and the colour of the spores may be seen and noted.

Family Agaricineæ, Massee.

SECTION A.—*Leucosporæ*, Mass. (white-spore section).

Spores white or very slightly tinted. Gills in most species white at maturity; in many species, however, the gills are from the first, or at some stage of development, grey, yellow, rusty, &c., but these tints are not due, as in other sections, to the colour of the spores. Microscopic examination, or a spore-print, will reveal the true colour of the spores.

SUBSECTION I.—Stem central.

Plant fleshy.

(*a*) Cap separable, and not coalescent with the stem.

Volva and ring present	(1)	*Amanita.*
Volva present but no ring	(2)	*Amanitopsis.*
Ring present but no volva	(3)	*Lepiota.*
Volva and ring both absent...	(4)	*Schulzeria.*

(*b*) Cap and stem homogeneous, and confluent with each other.

Ring present	(5)	*Armillaria.*
Ring absent, gills membranaceous, sinuate...	(6)	*Tricholoma.*
Gills decurrent	(7)	*Clitocybe.*
Gills decurrent with swollen edges	(8)	*Cantharellus.*
Gills adnate. Parasitic on other agarics ...	(9)	*Nyctalis.*
Gills adnate, not parasitic; substance milky	(10)	*Lactarius.*
Substance rigid, brittle, not milky	(11)	*Russula.*
Substance waxy, not membranaceous ...	(12)	*Hygrophorus.*

(*c*) Cap and stem heterogeneous, but confluent.

Gills adnate, margin incurved	(13)	*Collybia.*
Gills simple; whole plant tough, coriaceous	(14)	*Marasmius.*
Gills adnate, margin straight, substance more or less with pale reddish juice or milky ...	(15)	*Mycena.*
Gills decurrent	(16)	*Omphalia.*

Plant membranaceous.

Gills free. No ring or volva	(17)	*Hiatula.*

SUBSECTION II.—Stem eccentric, lateral or none.

Plant fleshy	(18)	*Pleurotus.*
Plant coriaceous, corky or woody, persistent, rigid when dry. Gills toothed	(19)	*Lentinus.*
Gills not toothed	(20)	*Panus.*
Gills branched	(21)	*Xerotus.*
Gills channelled longitudinally, or crisped ...	(22)	*Trogia.*
Gills splitting longitudinally	(23)	*Schizophyllum.*
Gills anastomosing	(24)	*Lenzites.*

SECTION B.—*Rhodosporæ*, Mass. (rosy spore section).

Spores rose, pink, or salmon-pink coloured in the mass. Gills salmon-pink or rosy at maturity. In some species the gills are pale rose at an early stage, but become dark purple later.

SUBSECTION I.—Stem central.

(*a*) Cap discrete from the stem.

Volva and ring present	(25)	*Metraria.*
Volva present, but no ring	(26)	*Volvaria.*
Volva absent, but ring present	(27)	*Annularia.*
Volva and ring both absent	(28)	*Pluteus.*

(*b*) Cap and stem homogeneous and confluent.

Ring and veil absent, gills sinuate	(29)	*Entoloma.*
Ring and veil absent, gills decurrent ...	(30)	*Clitopilus.*

(*c*) Cap and stem heterogeneous.

Gills free, margin of pileus incurved when young	(31)	*Leptonia.*
Gills free, margin of pileus straight when young	(32)	*Nolanea.*
Gills decurrent	(33)	*Eccilia.*

SUBSECTION II.—Stem eccentric, lateral or none ... (34) *Claudopus.*

SECTION C.—*Ochrosporæ*, Mass. (ochre or yellowish spore section).

Spores pale or dark ochre to yellow or orange, clay or yellowish-brown coloured in the mass. Gills dingy, ochraceous, brownish or ferruginous ; no tint of purple present.

SUBSECTION I.—Stem central.

(*a*) Cap discrete from the stem.

Volva present, no ring	(35)	*Locellinia.*
Volva and ring both absent	(36)	*Pluteolus.*

(*b*) Cap and stem homogeneous.

Ring present, usually growing on stumps and not on ground...	(37)	*Pholiota.*
Ring veil-like, cobwebby	(38)	*Cortinarius.*
Veil absent, gills decurrent	(39)	*Paxillus.*
Gills sinuate, cap smooth or viscid	(40)	*Hebeloma.*

Gills sinuate, cap fibrillose or silky ... ... (41) *Inocybe.*
Gills adnate, more or less decurrent, or rarely free ... ... (42) *Flammula.*

(*c*) Cap and stem heterogeneous.

Gills adnate, deliquescent ... ... (43) *Bolbitius.*
Gills adnate, margin of cap incurved ... (44) *Naucoria.*
Gills adnate, margin of cap straight ... (45) *Galera.*
Gills decurrent ... ... (46) *Tubaria.*

SUBSECTION II.—Stem eccentric ... ... (47) *Crepidotus.*

SECTION D.—*Porphyrosporeæ*, Mass. (purple-brown spore section).

Spores tinged with purple, or purplish-brown in the mass; gills blackish or brownish, with a tinge of purple at maturity.

SUBSECTION I.—Stem central.

(*a*) Cap discrete from the stem.

Volva and ring present ... ... (48) *Chitoniella.*
Volva present, but no ring ... ... (49) *Chitonia.*
Volva absent, ring present ... ... (50) *Agaricus (Psalliota).*
Volva and ring both absent ... ... (51) *Pilosace.*

(*b*) Cap and stem homogenous.

Ring present ... ... (52) *Stropharia.*
Ring absent.
Gills sinuate ... ... (53) *Hypholoma.*
Gills decurrent ... ... (54) *Deconia.*
Gills adnate or occasionally free, margin of pileus incurved when young, stem tough (55) *Psilocybe.*
Margin of pileus straight when young, stem fragile ... ... (56) *Psathyra.*

SECTION E.—*Coprineæ* (black spore section).

Spores black, or nearly so; gills black or dark-gray, and speckled with the black spores; no tinge of purple at maturity.

SUBSECTION I.—Cap discrete from the stem.

Cap and gills fugaceous, dissolving into an inky fluid.
Ring present or absent ... ... (57) *Coprinus.*

SUBSECTION II.—Cap and stem homogeneous.

Ring present ... ... (58) *Anellaria.*
Ring absent.
Gills decurrent ... ... (59) *Gomphidius.*
Gills adnate or free, pileus not striate ... (60) *Panæolus.*
Cap thin, distinctly striate, gills gray-black, no ring or veil fragments present ... (61) *Psathyrella.*

(*To be continued.*)

Official Milk and Butter Records.

M. A. O'CALLAGHAN.

In the following lists the records of further pure-bred cattle, numbering thirty, are given. Up to date the records of two hundred cattle have been published, so that information which should enable breeders of dairy cattle to select bulls suitable for improving their stock is gradually being accumulated.

Users of Jersey bulls are in a better position to make selections than other breeders owing to the large number of Jerseys which have been tested. This should all go towards enabling the users of Jersey bulls to get better milking results in the near future, because it is through the bulls, as a general rule, that cows obtain their milk and butter producing characteristics.

There are no sensational tests published this month, but the yield of Miss Walker's Jersey cow, Alacrity, is a first-class performance—464 lb. of butter for 273 days, and a yield of 1½ lb. of butter on the last day of the test, are figures sufficiently good to attract the attention of Jersey breeders in any country. Like many large yielders, Alacrity's pedigree is a short one, which is rather a pity. She is, however, a pure cow registered in the Australian Jersey Herd Book.

The next best performance is that of Brighton Zingara, the property of Mr. C. R. G. MacDonald, of Ingleburn. As may be seen from the tables, this cow produced 429 lb. of butter during the nine months' test, and on the last day of the test gave 1·37 lb. of butter. This cow is by the old champion bull Brighton King (imp.), a sire that comes of a noted milk and butter strain.

Another very good performance is that of the heifer, Maitland's Neatness, owned by Mr. O. H. Gollan. She was a month short of two years when she began the test, and she gave 333 lb. of butter during the nine months, and showed a production of 1·21 lb. of butter on the last day of the test, admittedly a very nice performance for a young heifer on her first calf.

Cows Tested under the United Dairy-cattle Breeders' Herd-testing Scheme for periods of 273 days.

Records of Miss E C. Walker's Jersey herd at "Yaralla," Concord.

Name of Cow	Age at beginning of test	Date of last Calving.	Total Milk.	Total Butter	Yield on last day of test.	
					Milk.	Butter.
	Years.		lb.	lb.	lb.	lb.
Fleur de Bois ..	3	3 Mar., 1913..	4,659	260	14·50	·92
Rufus Queen ...	2	31 ,, ,, .	5,633	280	14·25	·76
Alacrity	7	12 July, ,, .	8,863	464	27·50	1·55

RECORDS of Messrs. J. and H. Anderson's Jersey herd at Gladstone, Macleay River.

Name of Cow.	Age at beginning of test.	Date of last Calving	Total Milk.	Total Butter.	Yield on last day of test. Milk.	Butter.
	Years.		lb.	lb.	lb.	lb.
Egyptian Lass	6	20 Oct., 1912...	5,530	262	12·00	·65
Petersham	4	30 Sept., ,, ..	4,231	236	8·00	·57

RECORDS of Mr. F. G. Flower's Jersey herd at Binna Burra.

Name of Cow.	Age at beginning of test.	Date of last Calving.	Total Milk.	Total Butter	Yield on last day of test. Milk	Butter.
	Years.		lb.	lb.	lb.	lb.
Daphne	4	30 Mar., 1913 ..	3,544	205	6·50	·40
Madeline	6	25 ,, ,, ...	4,793	234	7·50	·33
Honeycomb	6	1 April, ,, .	4,417	225	6·50	·30
Ginger III ..	6	30 Mar., ,, .	3,361	202	6·00	·33
Favourite . ..	6	24 July, ,,	4,708	249	16·00	1·02
Princess	6	9 ,, ,,	4,305	243	12·50	·85

RECORDS of Mr. O. H. Gollan's Jersey herd at Woodburn.

Name of Cow	Age at beginning of test.	Date of last Calving	Total Milk	Total Butter.	Yield on last day of Test. Milk	Butter.
	Years.		lb.	lb.	lb.	lb.
Silver Bowl	5	31 Jan., 1913	4,938	264	13·00	·81
Constance	7	8 Nov., 1912 .	4,936	265	4·75	·36
Lady Primrose	6	27 May, 1913	6,127	315	17·25	·87
Keilor	7	25 ,, ,, .	4,588	218	9·00	·47
Ruby	6	29 ,, ,, ..	5,264	330	14·50	1·05
Adeline	6	2 June, ,, .	5,758	284	17·00	·84
Pastime	3	1 July, ,, ...	3,606	204	9·00	·56
Canary's Annie Laurie..	3¾	9 ,, ,, .	4,570	270	14·00	·95
Crystal	3 years 10 m'ths	14 June, ,, ...	4,026	226	12·50	·90
Canary's Juanita ...	2¾	17 ,, ,, ..	4,238	229	15·00	·85
Maitland's Neatness ...	1 year 11 m'ths	8 July, ,, ..	5,581	333	18·50	1·24
Olive	7	22 ,, ,, ...	5,873	325	18·00	1·18
Mayoress	3	10 ,, ,, ...	3,310	228	9·00	·58
Quicksilver	8	7 ,, ,, ...	5,098	249	11·25	·73
Thelma of Melrose III...	2½	9 Aug., ,, ...	3,541	234	11·00	·81
Canary's Beauty ...	5	3 ,, ,, ...	5,551	289	16·50	·92
Optician's Brighton Countess..	7	21 July, ,, ...	3,237	212	7·00	·51

RECORDS of Mr. C. R. G. MacDonald's Jersey herd at Ingleburn.

Name of Cow.	Age at beginning of test.	Date of last Calving	Total Milk.	Total Butter.	Yield on last day of Test.	
					Milk.	Butter.
	Years.		lb.	lb.	lb.	lb.
Brighton Zingara ...	3	14 May, 1913...	7,560	429	19·00	1·37
Maitland's Meg III ...	8	5 ,, ,,	6,717	368	17·50	·99

MOSQUITO DESTRUCTION ON THE NORTH COAST.

ATTENTION has again been directed to the prevalence of mosquitoes on the North Coast, and statements have been made that they are now fairly troublesome where none ever existed previously. It was suggested that an officer of the Department should be sent up for a considerable time, even a year, to study the origin and habits of the pests, and endeavour to find some means of preventing their spread. The matter is all the more important from a stock-owner's point of view, inasmuch as stock are tormented, and, in some cases, young pigs have been killed by the mosquitoes. Mr. Froggatt, Government Entomologist, reported in the following terms :—

In connection with this matter, I beg to state that there would be no necessity to send anyone to the infested districts to study the habits of the mosquito. The destruction of the mosquito is a matter depending on the amount of money available for the purpose; although it could be done, the work would be very expensive, as it would necessitate the destruction of the breeding grounds of the mosquitoes in the large swampy area around Lower Southgate and Harwood It would require the united action of the residents, and the expenditure of some thousands of pounds in ditching, draining, and filling up places, or, where the expense of draining is too costly, treating them with oil.

In the latest report from the State of New Jersey, U S.A., where conditions somewhat similar to those obtaining on the Clarence River are found, the salt marsh-work in 1912 cost £5,000, for which 6,197 acres were drained, and 1,036,180 feet of ditching were cut during the operations. The marsh lands in question are along the coast, near fashionable watering places for the residents of New York, and the expenditure, therefore, pays the land-owners.

In the open swamps and stagnant ponds, the only effective course open is to drain and fill them up, and where they are close to houses, to treat with kerosene. Gold-fish and top minnows can be placed in small ponds and in any deep water, but if placed in shallow swamps, retreat ponds should be cut at the deepest points, into which the small fish can retire as the shallow water dries back. Mosquito larvæ are soon cleared out of deep water by fish and carnivorous insects.

The money in the United States is raised in each mosquito-infested county of a State, and an inspector is appointed to see the work carried out. The State Entomologist acts only as an adviser to the local committees. Some such method would have to be adopted in mosquito-infested areas in New South Wales.

The destruction of the local house or farm mosquito is another matter, and this local pest could be very much reduced if each householder were to make himself a sanitary inspector of his own premises, and provide no harbour for mosquito larvæ. If all water tanks and tubs are screened with wire gauze, so that mosquitoes that may hatch in them are prevented from escaping, and every small tin, tub, bucket, and water-jug is emptied every few days, mosquitoes will not breed about the house. An old jam tin containing half a pint of rain water can breed enough mosquitoes to annoy a whole household. Therefore, no empty tins, broken jars, old buckets, or anything that will hold water should be left about the house or on rubbish heaps. It might be interesting to note that the first thing they do in the West Indies when yellow fever breaks out, is to send an anti-mosquito brigade out with carts and drays to gather up and bury, or else send out to sea, every old tin in which mosquitoes could breed.

Queensland Prickly Pear A.—Growing along a fence at Westwood, near Rockhampton, Q.

Queensland Prickly Pear A.—Growing through a Kurrajong tree at Westwood, near Rockhampton, Q.

The Prickly Pears of Interest to Australians.

J. H. MAIDEN,
Government Botanist of New South Wales, and Director of the Botanic Gardens, Sydney.

No. 11.—Queensland Prickly Pear A (*Opuntia sp.*).

I do not know the botanical name of this species, although I have endeavoured to obtain it. For some years past American botanists have been giving especial attention to the peculiarly American genus *Opuntia*, and we have recently had such a flood of new species that it is often difficult, in the absence of living specimens of the types, to identify them. It may be borne in mind that the dried herbarium specimens, so useful in ordinary plants, are of very little use in the case of succulent ones like these, while good coloured plates, except of the commonest species, are very rare indeed.

As I am not absolutely certain of the botanical name in this case, I think it better to simply call it "Queensland Prickly Pear A," and when we learn its botanical name it can easily be added. If I were to put a botanical name with a query mark some people might omit the query.

Vernacular Name.—In Queensland it goes by the name of "Red Mexican" (in comparison with another), but we had better wait to see what the botanical name is before we recommend any vernacular name for adoption.

Habitat.—As I do not know its botanical name, it is obvious I cannot state its original habitat. It is moderately abundant in Queensland, and I have received it from Rockhampton, also from Gracemere and Westwood, 7 and 31 miles, respectively, west of Rockhampton. Mr. Temple Clerk informs me that it also occurs at Hagen's Hill and Dingo.

(No *Opuntia* is indigenous to Australia.)

Botanical Affinity.—Comparison of the ripe fruit, and examination of the clusters of brownish-golden spinules on the bud and flower remind us of *Opuntia Ficus-Indica* (see this *Gazette* for January, 1913, p. 49), but the fruit section and the profusion of white spines justify us in looking upon it as a distinct species.

It has been suggested that it may be identical with *Tuna Leonora*, referred to in "The Tuna as food for man" (Griffiths and Hare), U.S. Department of Agriculture, Bureau of Plant Industry, Bulletin No. 116 (1907), p. 53, and "The Tuna as a food for man," by the same authors, Bulletin No. 64, New Mexico, p. 68.

But our "Queensland Prickly Pear A" can hardly be described as "Joints deep dark green . . . . flowers orange, with greenish filaments . . . . fruit almost globular, deep dull red . . . . rind of medium thickness." Nor can it be said "This tuna is small," this one being rather large.

It has a greyish or whitish appearance.

Fruit.—Its size and appearance is indicated by the plate; it is palatable, and the photographs show in what profusion it is produced.

It is a Pest.—Note the large size of the joints ("leaves"), the profusion of powerful spines, the comparatively great height of the plant, the width of the clumps being as much as 40 feet. It is spreading, and should be checked; at the same time its aggressiveness is not comparable with that of the Pest-Pear.

Illustrations.

The coloured plate was drawn from a specimen received originally from Westwood, and which flowered in the Botanic Gardens, Sydney.

The accompanying photographs, by Mr. A. Temple Clerk, are from Westwood, near Rockhampton, Queensland.

(1) Growing along a fence.

(2) Growing through a Kurrajong tree.

The Export of New South Wales Cheese to London.

The Minister of Agriculture is in receipt of the following communication from the Agent-General in London, concerning a recent consignment of cheese from this State:—

The lot carried well, and is regarded by the trade as of good commercial quality, but lacking in the flavour and texture common to Canadian brands. A proportion of the consignment was made up of loaf cheese with eight to the crate, and the balance of four to the crate. Neither of these sizes is desired by the English trade, owing to the losses which follow their disposal over the counter, and, as there appears every prospect of a development in the demand for Australian cheese, consideration should be given to the question of weights, which are required to be between 60 lb. and 70 lb. per cheese, with two in a crate.

I would further suggest that the crates be left more open to allow of a better circulation of air during transport.

It would appear that the original intention of the maker of this cheese was to market the product locally, for had it been purposely made for export to England some alteration in the process of manufacture would have been necessary, apart from the question of weights. Before cheese is ready for export it should be thoroughly set—that is to say, it should not be too green, otherwise a serious check in ripening may result in the ship's chamber, more particularly if the temperature be too low.

On the whole, the flavour of this cheese was clean and free from fodder or other objectionable taints. Mellowness, which is a valued feature of British and Canadian cheddars, was lacking, and its place was, in some cases, taken by a sharpness which does not appeal to the taste of the English consumer. As a mild cheese is required for this market, a low acidity in manufacture is necessary, and precautions in the treatment of the milk and the ripening of the cheese will need to be taken.

The texture was inclined to be loose, open, and dry, instead of close and silky, and the remedy for this is in the hands of the maker. The colour was quite satisfactory, and with the suggested attention to future lots intended for export a good market may be safely anticipated for some considerable time. The prices realised for the consignment were from 64s. to 64s. 6d. per cwt. for the large sizes, but no sales have yet been made of the small sizes.

QUEENSLAND PRICKLY PEAR.

[illegible]

Second North Coast Egg-laying Competition.

GRAFTON EXPERIMENT FARM.

A. H. HAYWOOD, Manager, and M. L. MYERS, Registrar, Grafton Experiment Farm.

THE second of the North Coast Egg-laying Competitions concluded on 31st March, after running the full period of twelve months. As this was really the first competition here to cover a whole year, the rules had to be amended in several respects from those which governed the first competition, which ran for nine months only. In view of this, it has been deemed advisable to reprint the rules, and these have therefore been incorporated later on in the report.

During the earlier months of the competition the birds were under the care of Mr. J. Young, as poultryman, and consequent upon his resignation, Mr. D. S. Thompson, late Poultry Expert at the Hawkesbury Agricultural College, was transferred to this Farm and placed in charge of the poultry section. In the interval the work was carried on with temporary labour.

Observations.

The competing birds were drawn from the Clarence, Richmond, and Tweed districts, and when the records are compared with other competitions whose managements accept entries from all over their State and also take interstate entries, it will be found that our results are most encouraging. An average of 190 eggs per bird, with a net value of 10s. 8d. each over cost of food, demonstrates what it is possible to attain under local conditions, and foreshadows a bright future for the industry.

Size of Leghorns.

Laying competitions in general have shown that there is a tendency to reduction in size in all the breeds participating, particularly in White Leghorns. It appears that the diminution in size is attributable to incorrect breeding and selection, and to some extent to too early laying. No doubt some breeders are prone to sacrifice size, conformation, and constitution in favour of laying qualities alone, and it is advised that the standard of the White Leghorn should be maintained. The standard of White Leghorn pullets 7 months old, according to the Government Poultry Expert, should be not less than $3\frac{1}{2}$ lb. weight, and it is possible that this standard will be adopted in future competitions, and all birds not attaining thereto will be rejected. Intending competitors for next year would do well to bear this in mind, and to note that seventeen pens in the competition now under review would have been rejected, including the winning pen, had such a standard then been in operation.

System of Feeding.

The general system of feeding has been the same as in the first competition. The morning mash was one part bran to three parts pollard, mixed hot in the winter and cold in the summer. Twice each week bullock's liver and the soup therefrom was added. The evening ration consisted of wheat and cracked maize, the maize being increased and the wheat being decreased proportionately in cold weather. The quantity given to each pen would approximate 1½ pints. Chaffed green lucerne was fed at midday, with rape occasionally. Ground oyster-shell grit was always available. Water was renewed twice daily in hot weather and the water vessels swabbed out daily. Magnesium sulphate (Epsom salts) was freely used during the hot weather, and Douglas mixture during the moulting season.

Marketing.

The high price obtained for the competition eggs, under improved marketing conditions, has drawn general attention to what most producers were losing, and it is satisfactory to note that many local farmers are taking more care in this direction with results pleasing and profitable to themselves.

Committee of Management.

A. H. HAYWOOD, Manager, Grafton Experiment Farm.

J. HADLINGTON, Poultry Expert, Department of Agriculture.

D. S. THOMPSON, Poultry Instructor, Grafton Experiment Farm.

M. L. MYERS, Registrar, Grafton Experiment Farm, to act as secretary.

E. E. CRISPIN, H. G. MCKITTRICK, and A. C. CROUCH, representing the Clarence Pastoral and Agricultural Society.

G. WINGFIELD, representing the Ulmarra Agricultural Society.

F. W. COLLISON, representing the Lower Clarence Agricultural Society.

COMPETITION RULES.

1. The Second Competition to extend over the period from 1st April, 1913, to 31st March, 1914, inclusive. Competitors to deliver their birds at the Grafton Experiment Farm at least fourteen days prior to 31st March, 1914.

2. Each pen to consist of six pure-bred pullets, not less than 7 months nor more than 12 months old on 1st April, 1913.

3. All birds to be bred by, and to be the property of, the competitor.

4. The poultryman is empowered to reject any bird or birds that he does not consider of correct age. Any rejected bird must be replaced by the competitor with another bird of suitable age.

5. Upon the birds being accepted by the poultryman as being of suitable age, no protest will be entertained upon that point.

6. Any bird found to be suffering from an infectious or contagious disease, when delivered at the farm, to be rejected, and replaced by the competitor.

7. The poultryman shall reject any bird on arrival that is not a fair specimen of the breed entered, and such bird must be replaced.

8. One wing of each pullet must be cut before forwarding to the farm. The wing will be kept cut during the currency of the competition.

9. In the event of a bird dying, becoming diseased, incapacitated from laying, or developing vicious habits (such as egg-eating or feather-eating), the competitor must replace it with another of the same age and breed, upon being notified. In the event of the owner failing to replace such bird within fourteen days of being notified, the farm authorities are empowered to do so.

10. All eggs to become the property of the Department of Agriculture.

11. Eggs under 1½ oz. in weight or soft-shelled not to be counted.

12. Any pen, the eggs from which do not attain an average weight of 24 oz. per dozen before the expiration of the first four months of the competition, to be ineligible for a prize.

13. The competition to be decided by the total number of eggs laid by each pen (subject to Rules 11 and 12).

14. The market value of eggs from each pen to be recorded.

15. Records to be kept of the total quantities of the various food consumed, and the average cost per head.

16. No competitor shall withdraw any bird until the termination of the competition.

17. Certificates to be issued to all pens laying 1,150 eggs during the competition.

18. Any competitor violating or failing to conform to these regulations will be subject to such disqualification as the Committee may think fit.

19. All prize money to be paid a fortnight after the termination of the period for which it was won, provided no protest be entered in the meantime.

20. The Committee's decision in all cases of dispute to be final.

21. Every competitor shall forward to the manager of the Grafton Experiment Farm an entrance fee of £1 on allotment of pen, otherwise the birds will not be accepted. Such fees to be devoted to the prize fund.

22. Competitors will be limited to those residing within the North Coast District, from the Manning River to the Queensland border, inclusive.

Expenditure.

Maize and green feed were grown on the Farm, and charged up at actual values. All other supplies were purchased, mainly in the Sydney market.

Including freight charges, the actual average cost throughout the competition for the various foods works out as follows:—

Pollard, 1s. 2½d. per bushel; bran, 1s. 2¾d. per bushel; wheat, 4s. 2¼d. per bushel; livers and shins, 4d. and 6d. each respectively; oyster-shell grit, 4s. 9d. per cwt.

The maize was charged at 3s. 5¾d. per bushel, being the average price of prime River maize on the Sydney market, less 8d. per bushel, cost of marketing. A value of 10s. per ton was set down for green lucerne and rape.

At the above rates, the cost of feeding works out as follows:—Wheat, £12 11s. 8d.; maize, £25 1s.; pollard, £18 14s. 10d.; bran, £4 18s. 7d.; livers, &c., £4 6s. 8d.; green feed, £3 10s.; shell grit, £1 8s. 6d;—total, £70 11s. 3d. The average cost of feed per hen was thus 6s. 11d. for the twelve months.

Revenue.

All eggs were sold, on commission, through Sussex-street merchants. Deducting all shipping, cartage, and selling charges, the returns gave a net result of £180 15s. 10d., being the actual cash value on the Farm. This gives a return of 17s. 8d. per hen for the twelve months.

After deducting the cost of feeding, the return shows £110 4s. 7d., or 10s. 9d. per hen, to cover cost of labour and interest on capital invested.

TABLE showing Number of Eggs sold and Average Net Price realised.

Month.	Number of Eggs Sold.	Average Net Price realised.	Month.	Number of Eggs Sold.	Average Net Price realised.
	dozen.	s. d.		dozen.	s. d.
April	96	1 10½	October	372	0 9
May	240	1 10¼	November ..	324	0 9¾
June	168	1 9	December .	276	1 0
July .. .	276	1 1	January	312	1 0¾
August .. .	348	0 10¼	February	228	1 4½
September ..	384	0 9½	March	192	1 7

This represents an actual value, on the Farm, of 1s. 1¼d. per dozen over the whole twelve months.

Breakages in Transit.

Out of ninety-five consignments, breakages were reported in fifty-three. These ranged from a quarter of a dozen to three dozen, but the general average was about half a dozen. We do not appear to have got much further ahead in this respect.

The Prize List.

1. Greatest Number of Eggs.—1. D. S. H. Moreton, £4. 2. D. McPhee, £3. 3. Mrs. E. E. Hattersley, £2. 4. W. E Butters, £1 10s 5. E. E. Crispin, £1. 6 E. A. Trevitt, 10s.

2. Winter Test. 1. D. McPhee, £2 2. D. S. H. Moreton, £1 10s. 3 Hewitt and Harrison, £1.

3. Market Value. 1. D. S. H. Moreton, £1 10s. 2. D. McPhee, £1. 3. W. E. Butters, 10s.

4. General Utility.—1. F W. Collison, £1 10s. 2. C. H. Butters, £1.

5. Monthly Prize Money.—D. McPhee, £2 5s ; D S. H. Moreton, £1 17s. 6d. ; Mrs. E. E. Hattersley and L. J. O. Smith, £1 2s. 6d. each ; A. Bodley (jun.), W. E. Butters, and P. C. Sanders, 15s. each ; F. W. Collison, 7s. 6d.

The eggs from Mrs. H. G. McKittrick's pen of Black Orpingtons, though second in point of numbers, did not attain the requisite weight, and were consequently ineligible for participation in the prize money.

Certificates.

The owners of the following pens gained certificates :—D. S. H. Moreton, Mrs. H. G. McKittrick, D. McPhee, Mrs. E. E. Hattersley, W. E. Butters, E. E. Crispin, E. A. Trevitt, A. Bodley (junior), Messrs. Hewitt and Harrison, H. Long, J. C. McDougall, H. G. McKittrick (White Leghorns), H. Lunney, Messrs. Wingfield and Smith, F. W. Collison (two, White Leghorns and Black Orpingtons), L. J. O. Smith, A. L. Gregor, and C H Butters.

NET VALUE OF EGGS FOR EACH MONTH.

Owner and Breed.	April	May.	June	July	Aug.	Sept	Oct.	Nov.	Dec.	Jan.	Feb.	March	Total Value.
	Value of Eggs for Month of												
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1. Moreton, D. S. H., White Leghorns	10 1½	19 10¾	14 0	10 2	10 4	9 5½	9 4½	9 4½	11 3	11 3¾	12 6¾	13 11½	141 10
2. McKittrick, Mrs. H. G., Black Orpingtons	2 7¾	19 3¼	11 8	12 11½	10 8¼	8 6¼	8 0	9 1¼	10 4	9 6½	11 5	15 4¼	129 6
3. McPhee, D., White Leghorns	14 2¼	21 3¼	16 4	10 7½	8 10¼	8 1½	8 0	7 2¾	9 7	9 6½	10 6	9 5¾	133 9
4. Hattersley, Mrs. E. E., White Leghorns	10 11	12 9½	4 2¾	10 11¾	10 5	9 0¾	9 3	8 8½	10 10	9 10¾	11 11¾	12 6	121 7
5. Butters, W. E., White Leghorns	11 8½	16 9½	12 6½	8 2¼	9 1¾	8 6¼	8 1½	8 6¾	8 11	8 8	13 11¼	13 2	128 3
6. Crispin, E. E., White Leghorns	4 0½	16 4	14 7	8 11	9 2½	9 1½	8 9	8 11¾	10 1	11 3¾	11 7¾	9 5¾	122 6
7. Trevitt, E. A., White Leghorns	3 3¼	18 7¾	9 11	7 3½	8 6¾	8 9½	8 10½	8 6	10 10	11 1¼	13 3	12 1½	121 2
8. Bodley, A., junior, White Leghorns	3 8¾	15 1¼	10 4½	10 5½	9 4¼	8 4¾	8 6	8 6¾	8 5	12 5½	10 10¼	11 7	117 9
9. Hewitt and Harrison, White Leghorns	12 11¼	17 10¼	15 5½	8 6½	9 0	8 6¼	8 7½	7 1¾	9 0	10 0¾	7 11¾	6 11¾	122 2
10. Long, H., White Leghorns	8 1¼	12 0¼	15 5½	10 10½	9 8¼	9 3¼	8 11¼	9 3¼	11 1	9 11¾	5 10	3 9¾	114 3
11. McDougall, J. C., White Leghorns	10 9	17 8¾	11 6¼	10 7½	8 10¼	8 2¼	8 0¼	6 10½	9 3	9 6½	9 1½	7 1¼	117 8
12. McKittrick, H. G., White Leghorns	10 7¼	16 11½	14 0	8 11	9 3¼	8 9½	8 10¼	9 0½	8 3	6 11¼	8 1¼	5 8	115 6
13. Lunney, H., White Leghorns	5 1¼	14 7¾	4 4½	7 9	9 6	9 1½	8 11¼	9 1¼	10 7	10 5	10 6	8 2	108 3
14. Wingfield and Smith, White Leghorns	12 7½	16 2¼	13 10¾	10 4¼	8 8¼	8 2¼	7 6	7 1¾	6 2	8 8	9 4¼	8 8¼	117 5
15. Collison, F. W., Black Orpingtons	3 5¼	11 5	13 1½	10 3	9 11¼	9 5½	8 4½	7 10	9 2	8 2½	9 9¼	7 4½	108 5
16. Smith, L. J. O., White Leghorns	2 7¼	8 11¼	2 9¼	7 1¼	9 6	9 4¾	9 5¼	9 4½	9 9	11 9	10 6	12 7¼	103 10
17. Gregor, A. L., White Leghorns	6 2¼	15 3¼	8 2	9 1	8 11	9 0¾	8 5¼	8 11¾	7 2	9 5½	8 10¾	8 11¼	108 8
18. Collison, F. W., White Leghorns	10 1½	16 0½	8 3¾	10 4¼	10 5	8 11	8 0	7 2¼	7 0	9 0	7 10½	6 5¼	109 9
19. Butters, C. H., Black Orpingtons	9 11	18 11¼	11 6¼	10 6¼	9 0¼	8 4	7 9	6 8¼	8 4	6 8½	6 8¼	8 6¾	113 2
20. Crouch, A. C., White Leghorns	2 2¾	11 6¾	9 5¼	8 7¾	9 6¼	8 0¾	8 4½	8 3½	9 3	8 5¼	9 7	7 7¾	101 2
21. Hattersley, A. E., Silver Wyandottes	10 9	20 2¼	10 7¼	10 4¼	9 1¼	7 10¼	5 9¾	5 4¾	8 2	7 8¼	5 11¼	8 2	110 1
22. Vaughan, Miss A., White Leghorns	3 10¼	12 11½	12 10	8 6½	7 2¾	7 5½	8 3	7 6¾	8 8	10 4	7 6½	8 3½	103 7
* Grafton Experiment Farm, White Leghorns	12 5¼	9 6¼	4 8	8 1¼	8 6	8 2½	7 6¼	8 6	8 11	9 11¼	9 1¼	5 4¾	101 0
23. Ardill, G. F., White Leghorns	3 3¼	16 11½	12 4¼	8 4½	8 6	8 2½	7 2¼	7 1	7 4	8 9	8 2¼	6 2¼	102 6
24. Gerard, W. O., White Leghorns	2 2¼	6 2	5 10	9 7½	8 4¼	9 4	8 4½	8 2¼	8 7	8 11	9 5¾	7 10¾	93 0
25. McKittrick, E. O., White Leghorns	10 9	8 2	7 7	10 3	9 0¾	8 3¼	6 10½	6 7¼	7 7	8 4¾	7 11¼	7 6	99 1
26. Crispin, E. E., Silver Wyandottes	5 1¾	14 4	13 10¼	9 8¾	8 7¾	7 8	6 6¾	5 10½	7 2	7 1¾	7 11¼	7 7¾	101 9
27. Parker, A. G., White Leghorns	3 1½	11 3	8 3¾	3 7¼	8 4½	8 4	7 4½	7 8¼	8 4	8 9	11 2¼	8 9¾	95 2
28. McKittrick, H. G., Silver Wyandottes	4 11¾	12 0¼	13 10¼	8 7¼	9 6	7 6½	7 0	5 7¼	7 0	6 2¼	6 6	9 5¾	98 4
29. Sanders, P. C., White Leghorns	3 10¾	2 9¾	3 6	9 1	7 7	9 6½	9 4½	8 2	6 4	8 9	8 1½	5 6¼	82 8
30. Crispin, Mrs. E. E., White Leghorns	3 7	9 6¼	1 2	6 9	10 1½	9 2½	7 6¾	8 11	8 7	7 1¾	6 6	2 7½	81 9
31. Marks Bros., Silver Wyandottes	. .	4 3¾	4 8	5 3¾	8 8½	8 2¼	6 5¼	6 5¾	7 6	6 3¼	6 0½	8 5	72 4
32. Boothby, W. T., White Wyandottes	. .	0 1¾	3 4½	6 4½	9 8½	7 7¼	6 11¼	5 5½	7 11	6 11¾	6 6	6 3¾	67 4
33. Masters, H. M., White Leghorns	0 11¼	5 4	2 4	4 5	6 5½	6 10½	7 3¾	6 11½	5 0	9 2½	7 11¼	3 8¼	65 6

* Non-competitive.

Order of Merit.	Owner and Breed.	Eggs laid— April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Total.	Weight per doz. of eggs	Weight of birds on entering.	Weight of birds on leaving.	Deaths or replacement during competition.	Market value of eggs.
															oz	lb.	lb		s. d.
1	Moreton, D. S. H., Coraki : White Leghorns	65	129	96	113	146	142	150	139	135	125	110	106	1,459	25½	20	24	..	141 10
2	McKittrick, Mrs. H. G., South Grafton : Black Orpingtons.	17	125	80	144	151	128	128	135	124	108	100	123	1,363	22	22	30	..	129 6
3	McPhee, D., Southgate : White Leghorns	91	138	112	118	125	122	128	107	115	108	92	72	1,328	25	24	26		133 9
4	Hattersley, Mrs. E. E., Maclean : White Leghorns	70	83	29	122	147	136	148	129	130	112	105	95	1,306	24	20	20	..	121 7
5	Butters, W. E., Coutt's Crossing : White Leghorns	75	109	86	91	129	128	130	127	107	98	122	100	1,302	25	21	23	..	128 3
6	Crispin, E. E., Grafton : White Leghorns	26	106	100	99	130	137	140	133	121	128	102	72	1,294	24½	19	22	1	122 6
7	Trevitt, E. A., Murwillumbah : White Leghorns	21	121	68	81	121	132	142	126	130	126	116	92	1,276	25	17	25	..	121 2
8	Bodley, A., junior, Bungawalbin : White Leghorns	24	98	71	116	132	126	136	127	101	141	95	88	1,255	24	22	26	.	117 9
9	Hewitt and Harrison, Lismore : White Leghorns	83	116	106	95	127	128	138	106	108	114	70	53	1,244	25	22	23	1	122 2
10	Long, H., Grafton : White Leghorns	52	78	106	121	138	139	143	138	133	113	51	29	1,241	25½	20	21	..	114 3
11	McDougall, J. C., South Grafton : White Leghorns	69	115	79	118	125	123	129	102	111	108	80	54	1,213	25	20	23	..	117 8
12	McKittrick, H. G., South Grafton : White Leghorns	68	110	96	99	131	132	142	134	99	79	71	43	1,204	25	18	21		115 6
13	Lunney, H., South Lismore : White Leghorns	33	95	30	86	134	137	143	135	127	118	92	62	1,192	24	24	24	1	108 3
14	Wingfield and Smith, Southgate : White Leghorns	81	105	95	115	123	123	120	106	74	98	82	66	1,188	25½	21	24	2	117 5
15	Collison, F. W., Maclean : Black Orpingtons	22	74	90	114	141	142	134	116	110	93	86	56	1,178	27	26	39	..	108 5
16	Smith, L. J. O., Byron Bay : White Leghorns	17	58	19	79	134	141	151	139	117	133	92	96	1,176	25	19	22	.	103 10
17	Gregor, A. L., Byron Bay : White Leghorns	40	99	56	101	126	136	135	133	86	107	78	68	1,165	27½	19	21	.	108 8
18	Collison, F. W., Maclean : White Leghorns	65	104	57	115	147	134	128	107	84	102	69	49	1,161	26	19	28	..	109 9
19	Butters, C. H., Coutt's Crossing : Black Orpingtons	64	123	79	117	128	125	124	99	100	76	59	65	1,159	25	37	38	..	113 2
20	Crouch, A. C., Grafton : White Leghorns	14	75	65	96	135	121	134	123	111	96	84	58	1,112	26	18	24	.	101 2
21	Hattersley, A. E., Maclean : Silver Wyandottes	69	131	73	115	129	118	93	80	98	87	52	62	1,107	24½	29	34	..	110 1
22	Vaughan, Miss A., Ballina : White Leghorns	25	84	88	95	102	112	132	112	104	117	66	63	1,100	24	21	24	1	103 7
*	Grafton Experiment Farm : White Leghorns	80	62	32	90	120	123	121	126	107	113	80	41	1,095	23½	20	23	1	101 0
23	Ardill, G. E., Bungawalbin : White Leghorns	21	110	85	93	120	123	115	105	88	99	72	47	1,078	26½	18	22½	..	102 6
24	Gerard, W. O., South Grafton : White Leghorns	14	40	40	107	118	140	134	122	103	101	83	60	1,062	28½	21	29	1	93 0
25	McKittrick, E. O., South Grafton : White Leghorns	69	53	52	114	128	124	110	95	91	95	70	57	1,061	25	20	24	..	99 1
26	Crispin, E. E., Grafton : Silver Wyandottes	33	93	95	108	122	115	105	87	86	81	70	58	1,053	23	23	29	..	101 9
27	Parker, A. G., Boat Harbour : White Leghorns	20	73	57	40	118	125	118	114	100	99	98	67	1,029	26	20	29		95 2
28	McKittrick, H. G., South Grafton : Silver Wyandottes.	32	78	95	96	134	113	112	83	84	70	57	72	1,026	23½	22	31	..	98 4
29	Sanders, P. C., Grafton : White Leghorns	25	18	24	101	107	143	150	121	76	99	71	42	977	26½	20	21	2	82 8
30	Crispin, Mrs. E. E., Grafton : White Leghorns	23	62	8	75	143	138	121	132	103	81	57	20	963	27½	24	22	..	81 9
31	Marks Bros., Rous Mill : Silver Wyandottes	0	28	32	59	123	123	103	96	90	71	53	64	842	24½	17	28	..	72 4
32	Boothby, W. T., Goolmangar : White Wyandottes	0	1	23	71	137	114	111	81	95	79	57	48	817	23½	27	36	..	67 4
33	Masters, H. M., Wyrallah : White Leghorns	6	34	16	49	91	103	117	103	60	93	70	25	770	24	26	22	2	65 6
	Totals	1,414	2,928	2,240	3,353	4,362	4,346	4,365	3,921	3,508	3,471	2,712	2,176	38,796	.		.	†12	....
	Average per hen	6 9	14 3	11·0	16 4	21 3	21·3	21 3	19·2	17 2	17 0	13 2	10·6	190					...

* Non-competitive as regards prize money. † Fifteen deaths, result of abnormal heat-wave, are not counted in this table.

Rearing and Management of Chickens.

JAMES HADLINGTON, Poultry Expert.

Natural Incubation.

VERY little experience is required to raise chickens in the natural way. Good broody hens and strongly-fertilised eggs for hatching are the main factors, and very few people will be found who are not conversant with the procedure in this respect. But a few hints on handling even these may not be out of place. When setting a hen it is advisable to set more than one on the same date, and then when hatching day comes round, the chickens can be divided amongst the hens, giving fifteen to each hen. A good plan is to place the hen in a coop with slatted front on a place bare of grass, yet surrounded by a short-cut grass plot. Chickens brought out by incubators can be divided among hens. To proceed on this plan, sufficient broody hens to take the number of chickens expected are set on some eggs a couple of days before the incubator is due, then when the first eggs chip take one or two and slip under each hen, preferably at night, and next morning they will be ready to take a whole brood. This method can also be adopted by purchasers of day-old chickens.

A Suggestion.

In this connection care must be taken when the chicks are of different colours to give some of each colour to each hen, because, once having seen the one colour, the hen in most cases savagely peck at the chickens of other colours, and probably destroy them. The chickens should be kept with the hens up to about five weeks old. The coops should be removed from time to time on to new ground. After this the chickens can be put out in small colony houses with runs.

Artificial Rearing.

This is where the skill and aptitude of the poultryman is put to the test, and where some experience is necessary to success. Naturally the first requisite is a well-made brooder, capable of generating plenty of heat, and allowing for ample ventilation. These are the two vital points in connection with artificial brooding, and any brooder that is deficient in these respects is a delusion. There are various kinds of brooders on the market, and others can be home-made, but they all come under the following headings, viz.:—

First, there are the sectional brooders, which include outdoor brooders with hovers, indoor brooders with or without hovers, elevated brooders (*i.e.*, brooders standing on legs), ground-level brooders, hot air and hot water

brooders. Of course, it follows that a brooder house is necessary to accommodate sectional brooders with runs inside and out, so that in bad weather the chickens can be confined to the inside runs.

Then there is the hot water continuous circulatory system, heated with a stove with two lines of 2-inch hot water pipes traversing the whole length of brooders, the continuous line of which are divided into sections 4 feet x 2 feet. My method of regulating the heat in these is to have the tops opening up as a lid on each brooder.

There is also the heated room system, recently come into use. All these have their place in artificial brooding. Outdoor brooders are a cheap method of brooding a limited number of chickens, but they entail more work and attention, and are less successful in bad weather. Indoor brooding is much more economical and successful where large numbers have to be handled.

Whatever the plan adopted, a brooder to accommodate seventy-five to 100 chickens will require to contain 8 square feet of space, and I prefer this to be oblong in shape, 4 feet x 2 feet. This size will accommodate the number mentioned for the first week or two, when they will require to be thinned down to about sixty. I prefer thinning down in this way to having larger brooders, as the latter are not so easily kept cosy for the baby stage. Another important point in brooding is that all different ages should be run separately. The floors of the heated compartments should be covered with some kind of non-absorbent material loosely laid in, so that it can be taken out once a week and washed with a disinfectant. This is necessary to preserve the wood from contamination. The bottoms should also have sharp sand thrown over them to keep the excrement from adhering to the bottom; this saves labour in cleaning, and is otherwise beneficial to the chickens.

Heat Required.

The brooders should stand at 90 degrees to receive the chickens, and when they are put in a careful watch is necessary to see that the temperature does not go too high. The heat mentioned should be maintained during the first week, after that it should be reduced a few degrees during the next two weeks, and lower still as they get older, hardening them off to do without heat at five to six weeks in cold weather and four to five weeks in warm.

A Thermometer Necessary.

It is often asserted that no thermometer is necessary. That may be admissible with experienced operators on a small scale, but instructions are not easily conveyed without using them. Any other way of gauging the heat is crude and deceptive, and should not be relied upon. The heat should be taken as when empty, so that even one chicken can get the requisite amount of warmth, and when the chickens go up finally at night, their bodily heat will, of course, raise the temperature considerably; this then requires regulation, or it becomes too great. When the chickens withdraw from the brooder in the morning, early regulation is necessary to maintain the temperature of the empty brooder to the required height.

Feeding the Chickens.

First of all, when the chickens are taken from the incubator no feed or water is necessary for the first thirty-six to forty-eight hours, unless the hatch has been unduly prolonged, when it is advisable to put a little feed down so that the first hatched ones will commence to feed. There should be no fussing about teaching chickens to feed. There is probably no better or safer feed for chickens for the first two days than rolled oats, or very coarse oatmeal, but some raisers use hard-boiled yolks of eggs rubbed up with stale bread crumbs, but the use of this entails great care on the part of the operator to see that it is all eaten up and none left about after each feed, or bowel troubles will result. Other operators get equally good results by soaking stale bread in milk, squeezing out all surplus moisture, and drying up with pollard, feeding this for the first week or two.

There are different methods of feeding. One system consists of feeding all dry food composed of different grains. This gives very good results, and can be recommended where the attendant has other duties to perform, and is not always able to feed at regular intervals. A good mixture is as follows:—

40 lb. ground wheat
25 lb. ground maize
15 lb. ground kibbled oats (hulled)
10 lb. millet seed
6 lb. bone meal
4 lb. hempseed

100 lb. all mixed together.

The writer prefers to use pollard and bran-mash mixed crumbly for the bulk of the feed, and to top up in the evening with ground grain or a chicken mixture similar to the above. Chickens should either be fed five or six times a day up to, say, three or four weeks of age (less often will do later), or the feed should be constantly before them. In the latter case it will be advisable to let them run a bit short for an hour or two occasionally to sharpen their appetites. My own practice for many years has been to feed rolled oats, such as is used for breakfast porridge, and dry just as bought, for the first two days; after this to feed principally upon bran and pollard mash, mixed with milk. To mix this mash properly, proceed by pouring heated milk over the bran, then mix in the pollard, using about one-third bran to two-thirds pollard in ordinary medium samples, using more or less bran according to whether the pollard is fine or coarse. Four ounces of common salt should be dissolved in the milk before mixing, to every bushel of dry matter. This is supplemented by finely-crushed grain wheat and maize at the evening feed, or a little at any time of the day. Finely chaffed lucerne, grass, or some other succulent green feed, is very desirable all through the life of the chicken; although many chickens are successfully reared without it. There is this also to be considered: as a matter of practical experience it is found that chickens brought up to the use of abundance

of green feed will eat the largest quantities of it in after life. Not only is this healthful and productive of the best returns, but it is an economical factor in feeding, as green feed is often abundant and cheaply produced. At these times a great saving of more expensive feed results from the fact of them eating more than would be the case if unaccustomed to it.

At five or six weeks the chicks should be brought on to full grain feed at night, and will require feeding less often as they get older. Whatever system of feeding is adopted it is most essential that finely-ground grit should always be before them; also powdered charcoal is desirable. Both of these should be put into the runs where the chickens have access to it, and be kept dry. At this stage, too, they will be taken from the heated brooders to cool ones, because if put right out into adult quarters and a cold snap ensues they will crowd together for warmth, and damage will be done.

It should be emphasised that the brooders should be kept free from vermin, and scrupulously clean, and an occasional disinfecting should mark all stages of chicken-rearing. In regard to the first, there will be scarcely any trouble on that score in artificial rearing, if the brooders are kept strictly separated from the quarters of the older fowls, or from contact with them in any way. In other words, on any well-regulated poultry plant, strict isolation of the brooding plant from the adult quarters is a feature to be insisted upon.

Handling Chickens after leaving the Brooders.

This stage marks a critical time in the life of chickens brought up in brooders, and, as already mentioned, they should be put through a hardening-off process, weaning them from the heat before being turned into roomy, cold quarters. Cosy, rather small houses should be provided at this stage, and every inducement offered for them to roost early. The sooner they take to the roost after six weeks the better, and flat roosts should be provided, not small round ones, as may be too often seen.

There is probably no better roost than a 3-inch x 1-inch hardwood batten, or series of them, and all should be on the same level. It is a mistaken notion to put one roost higher than another, for the simple reason that they will all scramble for the highest, until want of light leaves a large portion to go up into a corner, instead of on a roost at all. This crowding into corners is productive of disease and endless troubles in rearing. There is very little difficulty experienced in getting Leghorns or any of the lighter breeds to roost; but all the heavier or Asiatic breeds are refractory in this respect, requiring all the ingenuity of the operator to find means of overcoming this predilection to camp on the floor of the house.

Seasonable Work for Poultry-keepers.

JAMES HADLINGTON.

JUNE.

IF the advice given in these notes has been followed, everything will now be in order to commence the hatching season, and the only check upon operations will be scarcity of eggs, which is a seasonable feature to reckon upon. Consequently, operations will be retarded for some weeks to come, and the beginner will realise that "the winter laying strain" idea is a myth, and that winter laying is dependent upon many conditions, not the least important of which is want of warmth. Almost any hen will lay when the warm spring months come, but it takes pullets hatched at the right time, and well housed and cared for, to lay in the winter. Therefore, the beginner should not be unduly discouraged if fewer eggs than were expected are forthcoming. Nevertheless, a start should be made to set the eggs of heavy breeds, such as Orpingtons, Plymouth Rocks, Wyandottes, &c. Leghorns, and, in fact, all Mediterranean breeds, are better not set, at any rate in large lots, until July, as August is quite early enough for these to come out. At the same time the beginner will do well to get everything into working order even at the risk of having small batches out a bit on the early side.

A Definite Hatching Period.

It cannot be too strongly emphasised that to be successful with poultry-raising, a well-defined hatching period should be recognised, as should also the limitations of what is possible outside that period, and to what extent it is useful or desirable to operate. At any rate, the limitations set by Nature cannot be altogether disregarded, despite the oft-repeated claims as to improvement on Nature's methods.

Experience abundantly proves that so far as egg production is concerned, the nine weeks from the 1st of August to the end of September are the most profitable months in which to hatch layers of the Mediterranean breeds, and three or four weeks earlier for the heavier varieties. The months here indicated will vary according to district. The above applies to the warmer districts of the State, whereas in the colder parts, a month later will be more suitable. The pullets hatched previous to this time, while they are likely to be strong in constitution and development, are as a rule disappointing as layers, chiefly from the fact that they reach the laying stage early in the summer, and often go into moult at the approach of winter, and then to all intents come under the same condition as hens in the second year. At the same time there is some compensation from the fact that the cockerels will command very high prices, as they are available at a time when prime table poultry is always scarce. Therefore, there is much less objection to hatching too early than too late.

Breeders of dual-purpose breeds in particular, who happen to be in a position to make an early start, should study their own particular set of conditions in the light of the above remarks for the answer as to the best time for them to commence hatching.

Drawbacks to Early Hatching.

As already indicated, the paucity of eggs is the first check to the making of an early start. The hens over a year old are barely through the moult, and will, almost without exception, take a short spell after it is complete, before starting to lay again; in fact, little should be expected of them before spring. Then the pullets are for the most part on the immature side, and are not fit subjects for the breeding pen at too early a stage. The same applies to the male birds. Then when we look to the older males, very often there is trouble from that quarter, and as breeders, just after moulting, they are often very disappointing until the warmer weather sets in.

The experienced poultry-man is well aware of all these circumstances and conditions, and knows full well that with all his skill and forethought in assisting Nature for his own profit, he will still be much behind the point he aims at, at a given time, and is prepared to put up with the best he can get. But not so with the beginner, who has been led to believe in the great possibilities of winter laying, and has adopted it as an article of faith, and good fertility as its natural sequence. The object of these remarks is to dispel any such illusion, and save the beginner the disappointment that is often felt when actualities are encountered.

Early Winter Laying.

That many pullets do lay well in winter is fortunately the case, but that the bulk of them do not, especially early in the season, is equally true, and to get more of those that do is the aim of almost every poultry-keeper. But the majority of the pullets prove uncertain producers at this time, as is demonstrated every year by the high prices ruling for eggs during the autumn and early winter months.

If any doubt exists in regard to the precariousness of winter laying, one has only to refer to our laying competition records to be convinced of the fact. Here we have hundreds of pullets of the best-known strains brought together under identical conditions. Every competitor has done his or her best, both in breeding and selection, to pen pullets that are likely to start right off scratch on the 1st of April, and continue consistently through the winter months, since this is one of the best chances of ultimate success, yet only a comparatively small proportion of the entire penning are found to lay at all consistently through the winter. Nor is this feature entirely confined to new competitors, but operates more or less all round. Therefore it is clear that age and selection, no less than strain, play their part in this result.

Nor is this a new feature, or a feature peculiar to our climate or breeds of poultry. Our American cousins are given credit for their up-to-dateness and initiative in poultry-farming as in everything else, yet the same conditions obtain there as here, and even higher prices obtain in that country

than is the case here in winter. Recent advices are to the effect that a little over 3s. per dozen was reached in the principal cities of the United States of America last winter for new-laid eggs. It should also be remembered that there are large portions of that great country no colder than our own.

The Best Chance of Winter Layers.

That the time when pullets are hatched is one of the greatest factors in winter laying is fully recognised by experienced poultry-men. Strains and local conditions are also factors to reckon with. Poor layers are nearly always sure to put up poor records during the winter months: but it does not follow that pullets of known good strains will lay well in winter. So much depends upon the time they are hatched and the treatment they receive, as well as on local conditions. It is a fairly general experience in the county of Cumberland that July and August produce the best winter layers in the heavy breeds, and August and September in the Mediterranean breeds. There are exceptions to this rule to be found in small flocks, but not in any large numbers. It is found also that one month produces better results than another, under different local conditions and treatment; but these are the finer points that every poultry-man has to find out for himself, as the result of experience. One of the greatest drawbacks to early-hatched pullets continuing to lay in winter is their liability to go into a false moult in the late autumn, about April. The time they are hatched, and their subsequent development to laying point, are the principal determining factors. If they are hatched too early and develop well, they usually come on to lay at about five months of age, lay until March or April, when the cold weather sets in, and then break up. However, too early hatching is preferable to too late. Late hatching and autumn hatching, with their many drawbacks, have previously been dealt with in these notes.

Rust in Wheat.

A correspondent at Duri recently wrote to the Department as follows:—

> Last harvest I had a crop of Federation wheat slightly rusted, though I think the yield was not reduced, as the rust was too late for that, I think. From that crop I have some time since ploughed-in some self-sown wheat, the plants of which seemed badly rusted.
>
> Is it possible that these self-sown plants got their rust from the previous crop, or did the rust come as the result of mild, wet weather while the self-sown plants were growing?
>
> My real reason for asking the above is another question. Is it possible for the rust on the ploughed-in plants to remain in the soil active and able to infect my next crop, the seed of which is now being sown, or does the rust only come from some agency outside the soil, which is assisted by certain atmospheric conditions?

In reply, Mr. H. Ross, Chief Inspector of Agriculture, stated that there was no danger of a rusty self-sown crop of wheat which had been ploughed-in infecting a subsequent crop of wheat that had been sown on the same land. The rust only came as the result of certain climatic conditions favourable for its development.

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

Branch.	Honorary Secretary.
Albury	Mr. J. D. Lankester, Albury.
Baan Baa	Mr. P. Gilbert, Baan Baa.
Balldale	Mr. H. Elrington, Balldale.
Bathurst	Mr. J. McIntyre, Orton Park.
Batlow	Mr. A. C. Arnot, Batlow.
Beckom	Mr. S. Stinson, Beckom.
Borambil	Mr. H. A. D. Crossman, "Homewood," Quirindi.
Bungalong	Mr. G. H. Pereira, "Springdale," Cowra Road, *viâ* Cowra.
Canadian	Mr. C. Smith, Canadian Lead.
Cardiff	Mr. F. B. Cherry, Cardiff.
Carlingford	Mr. D. K. Otton, Carlingford.
Cattai	Mr. A. J. McDonald, Cattai, Pitt Town.
Collie	Mr. C. J. Rowcliff.
Coonabarabran	Dr. F. G. Failes, Coonabarabran.
Coradgery	Mr. J. Clatworthy, Beechmore, Millpose, Parkes
Coreen-Burraja	Mr. N. B. Alston, Coreen, *viâ* Corowa.
Courangra	Mr. S. H. Warland, Courangra, *viâ* Brooklyn.
Cowra	Mr. E. P. Todhunter, Cowra.
Crudine	Mr. F. W. Clarke, Crudine.
Cundletown	Mr. S. A. Levick, Roseneath, Cundletown.
Deniliquin	Mr. W. J. Adams, jun., Deniliquin.
Derrain	Mr. A. P. Hunter, Red Bank Creek, Matong.
Dubbo	Mr. T. A. Nicholas, Dubbo.
Dunedoo	Mr. G. E. Alexander, Dunedoo.
Erudgere	Mr. Frank Hughes, Erudgere.
Fairfield West	Mr. J. H Spargo, Hamilton Road, Fairfield.
Fernbrook	Mr. W. Marks, Yarrum Creek, Dorrigo.
Forest Creek	Mr. W. Thompson, Forest Creek, Frogmore.
Garra and Pinecliff	Mr. A. S. Blackwood, "Netherton," Garra, *viâ* Pinecliff.
Gerringong	Mr. J. Miller, Gerringong.
Grenfell	Mr. G. Cousins, Grenfell.
Gunning	Mr. E. H. Turner, Gunning.
Henty	Mr. H. W. Smith, Henty.
Hillston	Mr. M. Knechtli, Hillston.
Inverell	Mr. W. A. Kook, Rock Mount, Inverell.
Jerrara	Mr. A. O. Lane, Public School, Mullengrove, Wheeo.
Jindabyne	Mr. Sylvester Kennedy, Jindabyne
Katoomba	Mr. C. Wooller, Oliva Park Farm, Katoomba
Keepit, Manilla	Mr. J. B. Fitzgerald, Keepit, *viâ* Manilla.
Kellyville	Mr. Joseph Nutter, Kellyville.
Kenthurst	Mr. J. R. Jones, Kenthurst.
Leech's Gully	Mr. J. Donnelly, Leech's Gully, Tenterfield.
Leeton	Mr. C. Ledwidge, Farm 442, Leeton.
Little Plain	Mr. F. S. Stening, Little Plain, *viâ* Inverell.
Lower Portland	Mr. W. C. Gambrill, Lower Portland.
Mangrove Mountain	Mr. G. T. Hunt, Mangrove Mountain, *viâ* Gosford.
Martin's Creek	Mr. P. Laney, Martin's Creek, *viâ* Paterson.
Meadow Flat	Mr. F. J. Brown, "The Poplars," Meadow Flat, *viâ* Rydal.
Middle Dural	Mr. A. E. Best, "Elliceleigh," Middle Dural.
Milbrulong	Mr. O. Ludwig, Milbrulong.
Moruya	Mr. P. Flynn, Moruya.
Narellan	Mr. G J. Richardson, Narellan.
Narrandera	Mr. C. F. Pearce, Narrandera.
Nelson's Plains	Mr. V. Schlaadt, Nelson's Plains
New Italy	Mr. F. A. Morandini, New Italy.
Nimbin	Mr. J. H. Hutchinson, Nimbin.
Orangeville	Mr. C. Duck, Orangeville, The Oaks.
Orchard Hills (Penrith)	Mr. H. Basedow, Orchard Hills, *viâ* Penrith

Branch.	Honorary Secretary.
Parkesbourne	Mr. W. H. Weatherstone, Parkesbourne.
Peak Hill	Mr. A. B. Pettigrew, Peak Hill.
Penrose-Kareela	Mr. A. J. Bennett, "Brookvale," Kareela.
Ponto	Mr. A. D. Dunkley, Ponto.
Redbank	Mr. J. A. Graham, Woodlands, McAlister, *viâ* Goulburn.
Ringwood	Mr. Wm. Tait, Ringwood.
St. Mary's	Mr. W. Morris, Queen and Victoria Streets, St. Mary's.
Sackville	Mr. Arthur Manning, Sackville.
Sherwood	Mr. J. E. Davis, Sherwood.
Stockinbingal	Mr. J. Neville, Stockinbingal.
St. John's Park	Mr. J. C. Scott, St. John's Park.
Tallawang	Mr. G. Lincoln, junior, Tallawang.
Taralga	Mr. Dave Mullaney, Stonequarry, Taralga.
Toronto	Mr. J. G. Desreaux, Esmond, Toronto.
Tumbarumba	Mr. R. Livingstone, Tumbarumba.
Upper Belmore River	Mr. A. W. Fowler, Upper Belmore River, *viâ* Gladstone, Macleay River.
Uralla	Mr. E. A. Neil, Uralla.
Wagga	Mr. Thos. Fraser, Aberfeldie, Wagga.
Walla Walla	Mr. H. Smith, Walla Walla.
Wallendbeen	Mr. W. J. Cartwright, Wallendbeen.
Walli	Mr. A. V. Bloomfield, Walli.
Wetherill Park	Mr. L. Rainbow, Wetherill Park.
Wollun	Mr. C. E. Burke, Private Bag, Wollun.
Wolseley Park	Mr. H. McEachern, Wolseley Park.
Wyan	Mr. C. W. Harper, Myrtle Creek Railway Station.
Wyong	Mr. Edgar J. Johns, Wyong.
Yass	Mr. Cyril Ferris, Yass.

Notice to Honorary Secretaries.

It is important that a record of the meetings of the branches should be inserted in the *Agricultural Gazette*, and honorary secretaries are invited to forward to the Department a short account of the proceedings of each meeting, with a brief summary of any paper which may have been read, and the discussion that followed it, as early as possible after each meeting. Notes for insertion in the *Agricultural Gazette* must reach the Department before the 16th to ensure insertion in the following month's issue.

Insect Pests.—Quite a number of the branches have availed themselves of the Department's offer to supply a set of insects, being the common pests of the district, and the collections are now being cased. The Government Entomologist suggests that as each district has certain pests peculiar to its orchards and gardens, more useful work would be done if the members themselves collected the local pests (orchard, garden, and stock) and sent them to the Department, where they would be arranged, mounted, a descriptive label attached, and returned to the branch. Mr. Froggatt considers that such a collection would have a far greater value, as there would be more interest attached to the specimens when the members knew exactly where the pests came from, and where and how to find them.

Demonstrations in Clearing Land and Subsoiling with Explosives.

Demonstrations in clearing land and subsoiling with explosives will be given by Mr. H. C. Coggins, Assistant Inspector of Agriculture, to branches of the Agricultural Bureau. Branches who wish to take advantage of this offer are requested to make early application to the Department through their honorary secretaries.

Veterinary Lectures.

In connection with the lectures to branches of the Agricultural Bureau, it is herewith pointed out for the information of honorary secretaries that the following is the list of subjects of lectures which can be delivered to them :—

Horses.—(1) Conformation and Unsoundness (with lantern illustrations); (2) Colic and Treatment of Wounds; (3) Strangles, Influenza, and Tetanus.

Cattle.—(1) Tuberculosis (with lantern illustrations); (2) Contagious Abortion and Contagious Mammitis; (3) Ticks, Tick Fever, Tick Infestation and Eradication.

Sheep.—Parasitic Diseases of Sheep.

Pigs.—Diseases of Pigs.

General.—(1) Parturition of Farm Animals (with lantern illustrations); (2) Feeding of Farm Animals and Dietetic Diseases; (3) Sterility: Causes and Treatment in all classes of Stock.

Bee-keeping.

A series of lectures on bee-keeping is being arranged by Mr. R. G. Warry, Instructor in Apiculture. Secretaries, whose branches intend availing themselves of this opportunity to receive a practical insight into this branch of agriculture, are requested to make early application.

Demonstrations of Winter Pruning.

A number of demonstrations of winter pruning, &c., are being arranged, the following dates having been fixed for July :—

Place.	Date.	Officer.
Coradgery	July 7	J. G. R. Bryant, Assistant Fruit Expert.
Penrose	„ 15	„
Gunning	„ 20	„
Yass	„ 21	„
Wallendbeen	„ 22	„

REPORTS AND NOTICES FROM BRANCHES.

Borambil.

Mr. F. Wigan, Dairy Instructor, delivered a lecture before members of this branch on 29th April. Those present, though not numerous, were very interested in the address. Mr. Wigan briefly referred to the business part of dairying, and then dealt fully with the subject of second-class cream, describing the various causes and means of contamination and the best methods of preventing ill-flavours and taints.

Carlingford.

The members of the Carlingford branch of the Bureau have started a Potato Club after the American system, and fairly good crops of potatoes have been grown by some of the boys. The plots have turned out fairly well, and the yields of potatoes averaged at the rate of 5 tons 15 cwt. per acre.

The Secretary, in commenting on the results, states that Coronation, a variety not generally grown in the district, has done remarkably well, and is likely to become a favourite in consequence of the results. Prizes were awarded to Cyril Neil, Syd. Duffield, Kenneth Maher, Percy Bevan, Roy Jordan, and Reg. Kells.

Coradgery.

The monthly meeting of the Coradgery branch was held on 28th March, when there was a good attendance of members.

Rules were drafted for a Seed-wheat Competition amongst members of the branch.

Courangra.

A branch of the Bureau has been formed at Currangra with a membership of twenty-two to commence with. The following have been elected as office-bearers:—Chairman, Mr. George W. Hitchcock; Vice-Chairman, Mr. Austin H. Woodburn; Hon. Secretary and Treasurer, Mr. Septimus H. Warland.

The annual subscription has been fixed at 2s.

Fairfield West.

During the month of April a new branch was formed at Fairfield West with twenty-one members to commence. The following office-bearers were elected:—Chairman, Mr. C. L. Oakes; Vice-Chairmen, Messrs. A. Bennett, E. C. Hamilton, and Stutchbury; Treasurer, Mr. W. Stimson; Hon. Secretary, Mr. J. A. Spargo; Assistant Secretary, Mr. H. Godfrey.

The regular meetings are to be held on the second Thursday in each month.

Henty.

The following is the resumé of the lecture by Mr. H. C. Stening, Inspector of Agriculture, delivered at the March meeting, and crowded out of last month's *Gazette*:—

Varieties of Wheat and their Characteristics.

The subject of the lecture was "Varieties of Wheat suitable for the district, their characteristics and commercial value, and the grading and pickling of seed wheat." The varieties of wheat recommended for cultivation in the district were enumerated, and, in addition to their commercial value, the period of maturity, stooling capacity, habit of growth, and their individual merits and defects were mentioned. The varieties were classified according to commercial value as grain varieties, hay varieties, and dual-purpose varieties; and as to milling quality they were described as either Strong Red, Strong White, Medium Strong, or Weak wheats. The importance and advantage of grading seed wheat and the necessity for treating it for the prevention of bunt were stated, and an outline was given of smut and how it attacks wheat, and the various methods of fungicides employed as preventives.

At the conclusion of the lecture questions were invited, of which the following may be of wider interest:—

Question.—Do you consider that it is necessary to pickle seed that is sown on a dry soil?

Answer.—Yes. I would strongly advise that all seed should be pickled, whether sown on a dry or wet seed-bed. It is a risky practice to sow unpickled seed at any time. The experience of the 1912 season, in which many smutty crops resulted from unpickled seed sown on dry seed-beds, should be sufficient to explode the theory that seed sown on a dry seed-bed does not require pickling.

Question.— Why is it that Comeback takes smut worse than other varieties?

Answer.—Some varieties, for example Steinwedel, are more susceptible to smut than others, while some are very resistant, *e.g.*, Florence; but I am surprised to hear that Comeback takes bunt badly. My experience with this variety is that, although bunt-liable, it is not very susceptible to the disease.

Question.—Why is it that Comeback takes smut worse than other varieties? crops of other varieties on the same land were not bad, although the Comeback seed was clean and free from smut?

Answer.—It is impossible for anyone to decide on appearances that seed is free from smut. The smut spores are microscopic, and therefore cannot be detected by the naked eye. If a crop is smutty the seed must have been contaminated with spores, for it is imperative that, in order that a smutted crop be produced, living spores must have been attached to the seed.

Question.—Why is it that a self-sown crop never takes smut?

Answer.—The reason why self-sown crops are rarely, if ever, smutty is that there is almost invariably sufficient moisture available during the summer months to germinate the smut spores attached to the wheat grain, but insufficient to germinate the wheat, and as the smut depends on the wheat plant for its existence, it perishes from starvation.

Question.—Do you consider the f.a.q. standard as fixed for this season to be a fair and just one?

Answer.—The fixing of this season's standard at 64 has met with much criticism in many localities, but I may state that the Department of Agriculture also collected samples throughout the State for a comparison with the f.a.q. as fixed by the Chamber of Commerce. These samples were collected from each district by the Department's Inspectors, in proportion to the previous year's output of the district. The whole of these samples were mixed together, and the bushel weight of the mixed wheat was also 64. This would therefore confirm the finding of the Chamber of Commerce that 64 lb. per bushel represents the fair average quality of this season's wheat.

Question.—Can you tell us how the bushel-weight of the wheat collected from the southern districts compared with the f.a.q.?

Answer.—No. The whole of the samples taken throughout the State were mixed together, and no attempt was made to determine the bushel-weight of the wheat from the different districts.

Question.—Do you consider that the wheat stripped at the beginning of the harvest weighs heavier than that stripped late?

Answer.—The wheat harvested at the beginning of harvest is usually stripped as soon as ripe, and therefore weighs more per bushel than the late-stripped wheat, much of which is ripe for days, and sometimes weeks, before it is harvested, and during that time it is exposed to bleaching, which reduces the bushel-weight.

Question.—Are the samples for f.a.q. taken from graded wheat?

Answer.—Certainly not. The samples for determining the f.a.q. are collected by the Chamber of Commerce (through the agency of the branches of the Farmers and Settlers' Association) from farmers' ungraded wheat, just in the state that it comes from the harvesters. The Department's comparative samples were taken mainly from the loads of wheat as the waggons came into the railway yards.

Question.—What is your opinion of Dart's Imperial and Purple Straw?

Answer.—These are good old varieties, capable of yielding good crops of grain and hay. Owing, however, to their inferior flour-strength they are not included in the Department's recommendations.

Question.—How is it, then, that millers prefer them to Federation?

Answer.—I have consulted most of the millers carrying on business in the southern portion of the State on this subject, and there appears to be a great diversity of opinion among them; while some are anxious to get wheat of this description, there are others who consider them too inferior and who require nothing better than Federation. Milling tests show Federation to be of satisfactory flour-strength, but apparently some millers are receiving too large a quantity of this variety. They prefer a blend of varieties, and Dart's Imperial is specially favoured by millers for blending on account of the excellent colour of its flour.

Question.—Is it not a fact that seed grown year after year on the same soil degenerates until it is like carraway seed?

Answer.—So long as the sowing of ungraded seed is persisted in deterioration of the seed may very well be expected, for no precautions are taken to cull out the shrivelled product of the weakly plants in the crop. As "like begets like," the proportion of shrivelled grain will increase each year, until the seed is said to be "run-out." We would hear a great deal less about "run-out" seed if the practice of grading all seed-wheat became more general. If the best methods of cultivation are practised and careful attention is given to the grading of

seed-wheat, so that nothing but the best seed (which is the product of the more vigorous and prolific plants in the crop) is sown, there need be no fear of degeneration and no necessity for change of seed.

Question.—You would not advise the sowing of pinched grain?

Answer.—Sometimes, owing to adverse conditions at the time when the grain is developing, the whole yield of a crop is pinched, and when such grain is graded it will be satisfactory for seed purposes, for the graded grain, though pinched, is the product of strong, vigorous plants.

Question.—Do you consider that Comeback is worth 2d. to 3d. per bushel more than other varieties, like Federation?

Answer.—It is worth fully this, and if millers desire to encourage the cultivation of high-quality grain, like Comeback, it will be necessary for them to offer prices for the grain commensurate with its low yield as compared with the more prolific varieties.

Question.—Is Cedar suitable for dry or moist districts?

Answer.—Cedar is a fair yielder in either moist or dry districts. Under moist conditions, however, it is most difficult and almost impossible to strip, and for this reason it cannot be recommended for moist districts.

Little Plain.

At the March meeting of this branch, Mr. Walter White read the following paper:—

BEE-KEEPING.

Bee-keeping is an interesting and profitable side-line on a farm, when carried on extensively in conjunction with fruit-growing or lucerne-growing. If bees are only kept for household requirements, three or four hives should be sufficient.

The Hives.—These should be all the same size, so that part of one hive will fit on any of the other hives: for it is often necessary to change parts of a hive. Ventilation is a very important item. I believe in having a movable bottom board, so that in hot weather, by placing a stick between the bottom board and brood-box I have an entrance all round the box. This method checks swarming, and saves the bees the work of fanning air into the box. The entrance can be closed down if cold weather sets in. If the small entrance is used in hot weather, a cluster of bees will be seen on the front and sometimes on the bottom of the hive. These bees are idle, which means less honey will be gathered. I prefer the ten-frame hive to the eight-frame, as it gives more room for brood, and I find, by giving the queen plenty of space, she will send out fewer swarms, and always have a populous colony. The stronger the colony, the more honey it will produce. A sheet of queen-excluding zinc must be placed between the brood chamber and the super; if this is omitted the queen will often lay eggs in the super. In the brood-box I use frames 8 inches deep, and in the super 4½ inches deep. By using shallow frames in the super it is unnecessary to wire the combs. Strips of comb foundation must be fixed to the top of the frames; if this is not done the bees will build across the frames, instead of going straight. New combs should be extracted carefully, as they are much more easily broken than old combs. I like the self-spacing frames best, as you have only to push them together and they are in their proper place, with bee space all round them. If more than bee space is left the bees will build bur comb, which gives more work in handling. I find a sheet of linoleum is a good thing to place on top of the frames, as they cannot build bur comb on the lid, and it leaves fewer cracks for cold to enter in winter.

Proper stands should be made for the hives. Personally, I drive four blocks of wood into the ground, nail a piece of board on the front blocks and another on the back ones. I like the hive to be about 9 inches from the ground, as it protects the bottom board from the damp ground; and if ants attack a weak colony, I smear tar round the blocks, and so stop them. The entrance board should be wide, as it gives the bees a chance to get home in windy weather.

The hives should all be painted, white being a good colour; but, if the apiary is a large one, it would be necessary to paint some of the hives a different colour, so that the bees can locate their homes more easily. If the hives are placed too close, they are more likely to start robbing, and also become savage to handle.

Swarming.—Swarming is the greatest worry to the apiarist, and there are many devices to stop it. One way is to look through the hives every eight days and cut out all the queen cells. This is not a success, as it takes up too much time, and by repeatedly baulking the bees in their natural effort to swarm, they become dispirited, and will not work so well. Even when the queen cells are cut out they sometimes swarm out, and leave the old hive in a queenless condition.

I find by using a well-ventilated, ten-frame hive with a large entrance, and by keeping the extractor going, only about one prime swarm will issue in a year. When a hive becomes too populous, it can either be left to swarm naturally or it can be artificially swarmed. I prefer to let the bees swarm naturally, as bees artificially swarmed do not work with such vigour in their new hive as when left to swarm naturally. When a prime swarm issues it will often be followed in a few days' time by after-swarms. These are unprofitable, and I prefer to destroy the queen and put the bees back, or else mix them with a weak colony. This can be done by shaking the frames of a weak colony and the after-swarm on to the entrance board and allowing them to run into the hive together. By following this method they seldom fight, and the weak colony is strengthened.

Hives should always be kept in readiness for swarms. They always cluster before they fly away, except on rare occasions when they have a tree picked out beforehand. The swarm should be allowed to settle without being disturbed, for if disturbed before they cluster they become savage. When they have settled, working bees are sent out in various directions, to find a suitable nest; before these return the swarm should be shaken or scraped into a hive. When I have most of the bees in the hive, I place a piece of queen-excluding zinc across the entrance, taking care that I have the queen inside. The hive must not be shaken or moved before the zinc is put on, or the bees will often fly out. If the box cannot be moved at once, it can be left till night, and then transferred to its proper stand. I was once surprised to find more than one queen in a swarm; this occasionally occurs in an after-swarm, all the queens being virgin queens.

There are many strains of bees, but the Italian bees are most favoured for Australian conditions. The hybrid bees found in the bush will not keep down the moths, and the Italians will. It pays to have an extractor, even if only four or five hives are kept. I use a two-frame reversible extractor, and four super frames can be extracted at the same time, and about as fast as they can be uncapped. Care should be taken not to leave any honeycomb about the apiary, as a severe stinging may be the result. When stung with a bee, the sting should be scratched out with the fingernail, so as not to squeeze the poison sac. It is in the bee nests in trees where the moths and foul brood and other diseases thrive. I have sometimes been troubled with moths, but have never yet found a case of foul brood. This is a much-dreaded disease. In the advanced stage it can be detected by its peculiar odour. Healthy larvæ have a pearly-white appearance, but when affected with foul brood they become brown and then turn black. Capped brood when affected has small holes in it, and has a sunken appearance. If, when a pin is stuck into the larvæ and then drawn out, matter is seen hanging to it which flies back as the pin is pulled away, a sure sign has been obtained of the presence of foul brood. To cure foul brood, the bees can be transferred to a clean hive and shut up for a few days, so as to use up all the diseased honey in their honey sacs. The disease is spread by bees robbing honey from a diseased colony.

Some years the honey flow is much better than others, and last year the bees gathered honey all through the winter.

Lower Portland.

A party of members of the above branch paid a visit to the Hawkesbury Agricultural College on 9th March. The party was accorded a hearty reception, and was entertained and escorted through the various sections by one of the College officers. Much enthusiasm was evinced, and much valuable instruction obtained, and the party returned home gratified and appreciative.

Mangrove Mountain.

The annual meeting of this branch was held on 4th April, and there was a good attendance of members and ladies.

The election of office-bearers for the ensuing year resulted as follows:—Chairman, Mr. W. Cowlishaw; Vice-Chairman, Mr. C. L. Tange; Hon. Secretary and Treasurer, Mr. Geo. T. Hunt.

Meadow Flat.

At the meeting of this branch on 24th April an address on "Fruitgrowing in conjunction with the farm" was given by Mr. F. J. Brown.

Mr. Brown pointed out the suitability of the district for apple-growing, mentioning the accessibility to rail, the good roads, and the suitable sites for orchards that almost every farm in the neighbourhood possessed. Explanation of the method of planting was then given, and the following were named as the most suitable varieties:—London Pippin (Five Crown), Rome Beauty, Jonathan, Granny Smith, and Cleopatra. Stress was laid on the importance of planting different varieties, so as to ensure cross-pollination and fertilisation. The correct method of pruning a young tree was demonstrated, and the reasons explained.

Estimated returns were next mentioned. Mr. Brown's own results averaged 14s. per tree, net, for London Pippin (Five Crown), but for safety he cut it down to 5s. net per annum, which for 5 acres, planted at the rate of 125 trees per acre, gave £156 5s. Deducting 10 per cent. for depreciation and bad trees, the net returns would be £140 12s. 6d., or £28 2s. 6d. per acre. Was there any other crop that in that district would do the same, and keep on doing it so long as the apple?

Narellan.

Mr. H. Garland, of "Oran Park," Narellan, at the last monthly meeting of this branch, read an interesting and instructive paper on explosives in agriculture.

Mr. Garland stated that, in his opinion, gelignite was the safest and cheapest explosive to use on the farm. He went into the composition of gelignite, showing that it contains nitro-glycerine, gelatinised with chloride. The elasticity of the gelatine made the substance less susceptible to explosion by concussion, and therefore safer to handle.

Mr. Garland also dealt with the detonators, their construction and uses, and urged great care in their treatment. The methods of subsoiling and land clearing were explained, together with the use of the fuse for subsoiling, and the electric detonators for clearing, attention being drawn to the proper method of tamping. On the financial aspect, it was shown that by the use of explosives both time and money were saved.

Mr. Garland was listened to with great attention, and a hearty vote of thanks was accorded him for his interesting paper.

Sackville.

At the meeting of this branch on 9th April, the following paper was read by Mr. C. Aspery:—

Lucerne-growing.

It is only within the last half-century that this valuable fodder plant has been grown to any great extent by the farmers of New South Wales, though lucerne was grown as far back as the year 1823, on the Hawkesbury River, by the early settlers. Its cultivation has steadily increased until at the present time there are something like 120,000 acres devoted to it in New South Wales. It is now recognised as the king of fodder plants. The parts of the State where lucerne is chiefly grown to a great extent are Tamworth and the Hunter River, where some thousands of acres of land are under this crop.

Many farmers have not given this fodder a trial because they think the soil is not good enough to grow it, but it will grow on almost any soil to a certain extent. The best soil for lucerne is a deep alluvial, such as we have on this river. The deeper the soil the better the growth of lucerne. The roots go very deep down into the soil. On the Hunter River they have been found 30 feet below the surface. Lucerne is not like other fodder crops, for it will go down to moisture if the soil will allow it. It will stand the severest droughts, and though it may lie dormant for two or three months in a dry time, it will shoot out immediately after the first good shower of rain, when perhaps all other fodder crops are past recovery. Lucerne is a very long-lived plant, yielding profitable returns from the time it is twelve months old up to twelve or fifteen years. It averages from 3 to 4 tons of hay per acre per season, but yields of 6 to 7 tons are common in New South Wales.

The first thing a farmer has to do when he intends to plant lucerne is to work the soil thoroughly, and clean it of all weeds as far as possible, especially couch grass, which will very soon destroy the lucerne if allowed to. The best time of the year to sow is autumn, as the growth of weeds at this time of the year is not nearly so great as in the spring. If sown in the spring the weeds are likely to over-run the young plants, which make very slow growth for the first two or three months. The amount of seed sown to an acre is generally from 15 to 18 pounds. When the seed has been sown it should be harrowed, and then the ground should be rolled if it is not of too stiff a nature. If the ground is very stiff, it is better not to roll it, as if rain falls before the seeds germinate the crusted surface will stop the seed from germinating as it should.

The first cut of lucerne should be taken as soon as the plants are high enough, say, about 6 inches. This cut is of very little value, and it is better left on the field to rot than carted off, but the cutting helps the plants to form roots. A lucerne paddock should not receive any cultivation for, say, twelve months after sowing, but the plants by that time will have made a good, strong growth, and will stand cultivation without injury. If it is cultivated earlier than twelve months there is great danger of injuring the plants. The cultivation that is necessary is generally given after each cutting. A couple of good harrowings will generally be found sufficient, and if weeds appear, such as couch grass, the paddock should be carefully gone over, and the pest deeply dug up and the roots exposed to the sun.

If it is found at any time that the lucerne requires manuring, the following mixture is recommended by the Department of Agriculture as a suitable mixture:—1 cwt. bonedust, 6 cwt. superphosphate, 3 cwt. sulphate of potash. This should be applied at the rate of 2 cwt. per acre. One of the greatest enemies of lucerne is dodder. This plant will make very quick growth, and will soon ruin a lucerne paddock. It fastens itself to the plants of lucerne, and gets all the nourishment for its growth out of the plants, and becomes independent of the soil for food

The time that lucerne should be cut for hay is about when one-third of the plants are in flower. If it is left to get older it begins to shoot again from the bottom, and the cutting will greatly reduce the next crop, as a large majority of the young shoots will be cut off. The greatest care should be taken in the making of lucerne hay, as it is far more difficult to make than any other kind. If it is left to lie in the swath too long it will lose a great proportion of the leaf. It should be raked into windrows as soon as possible after cutting, when the dew has thoroughly dried off. It may be left in the windrow from half a day to a day before it is put into cocks. Lucerne should not be left in the field more than two days if the weather is fine from the time it is cut. Care should be taken not to put it into a shed too green, as it is likely to heat and spoil to a great extent. If green hay is desired instead of brown it should be given a little longer to dry in the field than if brown hay is desired. If it is thoroughly dry before carting off it will not change its colour after stacking, but if it is stacked on the green side it will change to brown hay.

Lucerne should not be fed-off by stock in the field in the early stages of its growth, and in any case lucerne that is continually eaten off by stock will not last nearly so long as if it were mowed when required and the ground cultivated. The damage caused to lucerne by feeding it off is very great, as the stock distribute all kinds of weed seed, which in all probability will germinate in the lucerne, and in the course of a few years the stand will be overrun with

weeds and will become practically useless. If the farmer intends to turn his stock on to a lucerne paddock they should have full stomachs, for if they are turned on the paddock with empty stomachs they are likely to eat too much, and to develop bloat or hoven, especially in the case of cattle. It is also bad to put stock on lucerne when it is wet.

Green lucerne is splendid feed for young stock, especially horses. If fed systematically they will make much quicker growth than if fed with any other feed. It is not a good plan to feed working horses on lucerne alone, as it makes them soft, and they perspire freely. It should be combined with oaten chaff and maize. Lucerne hay also makes them short-winded if fed alone. Green lucerne is a splendid food for pigs and poultry. If it is intended to cut lucerne hay into chaff it is a good plan to place the required amount on a floor and sprinkle it lightly with water. This will damp the lucerne through if done a few hours before it is intended to cut it into chaff. and will greatly reduce the dust, which is disagreeable, and will also make it draw far better through the machine than if it were put in dry.

Tallawang.

At a meeting of this branch, held on 18th April, the office-bearers tendered their resignations, and the following gentlemen were elected in their stead:—Chairman, Mr. W. Morgan; Vice-Chairmen, Messrs. T. Collins and F. Collins; Treasurer, Mr. M. O'Connor; Hon. Secretary, Mr. G. Lincoln, junior.

Taralga.

The annual meeting of the above branch was held on Monday, 20th April, at which there was a good attendance of members.

The Secretary reported that the number of members at present on the roll was forty-six. During the year ten ordinary meetings and three special meetings were held. Lectures were given by officers of the Department of Agriculture on three occasions. Various experiment plots have been established in the district.

The following office-bearers were elected:—Chairman, Mr. John Quinn; Vice-Chairmen, Messrs. Jas. Howard and H. Twynan; Treasurer, Mr. John Fitzgibbons; Hon. Secretary, Mr. Dave Mullaney.

Wollun.

The following is the text of the paper by Mr. J. McInnes, which he read at the February meeting of this branch, and which had to be held over last issue:—

Value of Bird Life.

It gives me very great pleasure to be allowed to read this paper before the branch. not that I wish to pose as an authority on the bird and insect pests, but because I am an ardent bird lover, not alone for their beauty and song, but on account of their great usefulness. I consider this very opportune, too, because we all recognise that it is high time we made a move to check some of our insect pests, and because I have seen in most districts where I have been some unnecessary destruction of bird life. My contention is that nature provides remedies for her own pests—that is, if not interfered with. An eminent ornithologist writes, "We are now beginning to see that the question is a highly complex one and quite beyond the ordinary observer, and that the best scientific knowledge is needed to deal with the matter."

We must not hold nature accountable for a plague of locusts; rather hold ourselves accountable for interfering with nature. With grasshoppers eating the grass above, and wire-worms, crickets, &c., at work on the roots, we should soon have bare fields. We stop at a dead wattle tree, and having torn off a strip of bark, we see how bark and wood are grooved and drilled in every direction by goat-moth and other larvæ. These insects ring the tree as effec-

tively as the woodman's axe. Here, then, we have the fate of every tree if insect life multiplied unchecked by birds. Every part of the tree has its guardian bird.

Wattle-birds and crows eat thousands of insects, the larvæ of which are believed to live on the roots of trees. The tree-runners, the tree-creepers, the thrush, the black cockatoo, and many others, wage war on the insects that shelter in the bark or bore into the wood. Wrens and tits examine the leaves and peer into every crack and hole in the smaller twigs, and the shrike-tit hunts among the topmost leaves. Then look at the swallows and swifts. The swift searches the upper air for flies, the house swallow in mid-air, and the fairy martin keeps in check the flies close to the earth and water.

Every kind of bird has its own special skill and its own particular field. No region is neglected—lower-air, middle-air, upper-air, river, marsh, sea—they are all occupied. How easy is it then to disturb this close-fitting plan when men use gun, trap, and poison indiscriminately. A splendid lesson can be learned from the tree-creeper and tree-runner. The tree-creeper works up the tree and the tree-runner works down. The tree-creeper catches all insects that can be seen with an upward glance, the tree-runner those that can be seen with a downward glance. These birds have bills specially fitted for their different works. Nature here has provided adequate means if not checked.

But supposing we allowed "sports" and destructive boys to kill every tree-creeper that showed itself, we would soon have a plague of tree insects. When man, through ignorance or wanton mischief, interferes with nature he must expect to reap the reward, be it good or bad.

I certainly am not against artificial means for the destruction of the insect pests. Use the best artificial means available, but use first nature's remedy, which is always the easiest.

An enthusiastic naturalist, writing on the return of the swallows, says, "It is mainly a question of food. For the last week or two there has been a rustling and a stirring of life among the myriads of pupa cases that lie in the grass, and under the earth and bark of trees, &c. (coming spring), and now the insects are leaving the pupa cases and are on the wing. A blowfly buzzes close to your ear. Soon there will be plenty of food for old birds and young." Here one of our worst pests is specially mentioned. Hear what the same authority says of the magpie: "We now pass through a paddock. It is an ideal field for magpies; for these birds like a thinly wooded field, and we sit down on a log to watch a pair that are feeding near us. The male bird is turning over dried pieces of manure and bark in search of insects. A little behind him and to the side is the female bird, which, bringing up the rear, sees that nothing is missed. They work with the air of birds who are masters of the situation, but who have no time to lose. Presently the male bird flies off to a neighbouring tree. With a field-glass we can see that the bill is full of insects. It has hardly returned when the female bird, with overflowing bill, flies up to the same place. We can see how hard yet systematically they work. They have fed themselves and three or four hungry birds." In a district in France where the rooks had all been shot for sport, they had to be imported and bred at a great expense.

In several of the northern countries of South America the Governments have built large, expensive day shelters for "bats," because they have proved of untold value in destroying the malaria-carrying mosquito. Look at the ibis, who devours millions of crickets and grasshoppers during the season. No district would ever be laid bare by locusts or caterpillars if it was frequented by plenty of ibis.

This next example is not presented for argument's sake, but just to show how popular feeling may be a little astray. In response to a popular outcry against the crow, the Washington Government (U.S.A.), ordered an inquiry on the crow. Naturalists examined the stomachs of over 1,000 crows, and the verdict was in favour of the crow.

In conclusion, I might draw your attention to an article written recently by a Wingen pastoralist, who says, in defending the much-maligned starling, of which he had numbers on his property, that since their advent he was not troubled with grasshoppers, blow-flies, or any other pest, and never crutches his sheep.

Departmental Note.—This last is an open question. Mr. Abbott has given no proof in his pamphlet that starlings eat flies or maggots.

Orchard Notes.

W. J. ALLEN.

JUNE.

Planting.

WHERE deciduous fruit-trees or vines are to be planted this season, it is best to start the work as early as possible, whether it be for refills in an established orchard, or the planting of a new orchard. The sooner now that any planting is finished the better will be the early root growth, as the roots start to throw out new growth in July. If the soil is dry, however, it would be better to defer the planting until more rain falls; but wherever there is sufficient moisture, this work should be pushed on to completion.

Plant only such varieties as have proved themselves suitable to the district, and only plant a few varieties. Wherever there are old growers in the district, it is well to be guided by them as to which they consider the best kinds of fruits to plant; then choose the very best varieties of the respective kinds, as it is only the high grade fruit which is worth growing.

Weak Trees.

Mark all weak and diseased trees when pruning, so that these can receive special treatment. Hard cutting back and the additions of heavy dressing of stable manure will assist weak trees in pushing forth a vigorous growth next spring.

Pruning.

In large orchards, pruning may be carried out this month; otherwise there is no hurry until July. A complete treatise in "Pruning" may be obtained from the Government Printer, Sydney; price, 1s; postage, 1d.

During the winter months officers of the Fruit Branch are holding demonstrations in tree pruning and grafting throughout the various fruit and farming centres. Growers should avail themselves of any such opportunities of seeing pruning work carried out on approved lines.

Fruit Fly.

In one or two districts there are still evidences of this pest, but owing to the rigid inspection and the compulsory destruction of all fallen and infected fruits, the damage caused by this enemy is greatly reduced. For trapping the adult flies, flat tins or saucers containing a small quantity of kerosene, hung on the sunny side of the tree, are very effective.

Liming.

Many orchards would be greatly benefited by the application of lime, and the present is a very good time to apply same, so that it will have had time to act upon the soil before spring manuring.

Subsoiling.

Subsoiling is very essential before planting an orchard. My experience is that trees planted on land that has been subsoiled thrive better than on land that has not been so treated. If the whole cannot be done at once it might be done where the trees are to be planted, say in strips 6 to 7 feet wide, and the remainder may be done from year to year, so that the whole might be finished by the third winter.

Interpollination.

It is claimed by some that where they have blocks of only one variety of apples planted, the crops are not nearly so good nor so regular as when several varieties are interplanted. There is very little positive knowledge concerning the interpollination of fruits, and no subject in pomology is in greater need of study. We chiefly know that the most productive orchards are usually those of many varieties, and that some varieties refuse to fertilise themselves. The safest practice, therefore, is not to plant more, say three or four rows, of any one variety, without alternating with a row of another variety of approximately the same blossoming date in the case of those fruits in which sterility is often apparent. A further reference to this subject will be found in the *Agricultural Gazette* for April, 1913.

A Handy Device for Burning Prunings.

An old iron tank and cultivator wheels are used in the make-up. The top is cut off the tank, and the manhole is used as a grating to allow the burnt prunings to fall to the ground. Holes are cut around the sides to act as a draught.

Skinless Barley at Experiment Farm Orchard, Bathurst.
This crop does well in the cooler districts, and makes most of its growth when the trees are practically dormant.

Black Winter Rye at Experiment Farm Orchard, Bathurst.
This crop is very suitable for green-manuring in the cooler districts, as it is a hardy and rapid grower.

GREEN MANURING IN ORCHARDS.

STALLION PARADES.

Date.		Place.	Time.
Thursday,	18 June	Murwillumbah	11·30 a.m.
Friday,	19 ,,	Mullumbimby	10 a.m.
Saturday,	20 ,,	Bangalow	10 a.m.
Wednesday,	24 ,,	Lismore	10 a.m.
Thursday,	25 ,,	Kyogle	1·30 p.m.
Friday,	26 ,,	Coraki	11 a.m.
Saturday,	27 ,,	Casino	9·30 a.m.
Monday,	29 ,,	Narromine	11 a.m.
Tuesday,	30 ,,	Wellington	10 a.m.
Wednesday,	1 July	Grafton	10 a.m.
Thursday,	2 ,,	Maclean	10 a.m.
Saturday,	4 ,,	Coramba	10 a.m.
Monday,	6 ,,	Bellingen	10 a.m.
,,	6 ,,	Eugowra	2 p.m.
Wednesday,	8 ,,	Dorrigo	Noon.
,,	8 ,,	Peakhill	2 p.m.
Friday,	10 ,,	Bowraville	10 a.m.
Saturday,	11 ,,	Macksville	10 a.m.
Monday,	13 ,,	Kempsey	10 a.m.
Tuesday,	14 ,,	Cumnock	11 a.m.
Wednesday,	15 ,,	Port Macquarie	10 a.m.
,,	15 ,,	Junee	10·30 a.m.
Thursday,	16 ,,	Molong	10 a.m.
,,	16 ,,	Wauchope	Noon.
,,	16 ,,	Cootamundra	10·30 a.m.
Saturday,	18 ,,	Lockhart	10 a.m.
,,	18 ,,	Taree	Noon.
Monday,	20 ,,	Forbes	11 a.m.
,,	20 ,,	Nabiac	11 a.m.
Tuesday,	21 ,,	Parkes	11 a.m.
,,	21 ,,	Wingham	11 a.m.
Wednesday,	22 ,,	Cudal	11 a.m.
,,	22 ,,	Gloucester	10 a.m.
Thursday,	23 ,,	Manildra	11 a.m.
,,	23 ,,	Dungog	11 a.m.
Monday,	27 ,,	Henty	10·30 a.m.
Wednesday,	29 ,,	Wagga	9·30 a.m.
Monday,	3 August	Condobolin	2·30 p.m.
Tuesday,	4 ,,	Bogan Gate	3·30 p.m.
Wednesday,	5 ,,	Trundle	10 a.m.
Thursday,	6 ,,	Orange	10 a.m.
Wednesday,	12 ,,	Temora	10 a.m.
Thursday,	13 ,,	Barmedman	2·30 p.m.
Friday,	14 ,,	Wyalong	11·30 a.m.
Monday,	17 ,,	Ardlethan	3 p.m.
Tuesday,	18 ,,	Richmond	11 a.m.
Wednesday,	19 ,,	Dural	11 a.m.
Thursday,	20 ,,	Penrith	11 a.m.
Friday,	21 ,,	Luddenham	Noon.
Monday,	24 ,,	Dubbo	10 a.m.
Tuesday,	25 ,,	Raymond Terrace	Noon.
,,	25 ,,	Gilgandra	2 p.m.
Wednesday,	26 ,,	Gulargambone	2 p.m.
Thursday,	27 ,,	Coonamble	2·30 p.m.
,,	27 ,,	Muswellbrook	3 p.m.
Friday,	28 ,,	Denman	10 a.m.
Saturday,	29 ,,	Scone	9·30 a.m.
Tuesday,	1 September	Canowindra	11·30 a.m.
,,	1 ,,	West Maitland	12·30 p.m.
,,	1 ,,	Crookwell	10 a.m.
Wednesday,	2 ,,	Cowra	10 a.m.
,,	2 ,,	Gunning	10 a.m.
Thursday,	3 ,,	Lyndhurst	3 p.m.

Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull.	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn ..	Imperialist ...	Florio	Lady Nancy of Minembah.	Berry Farm ..	*
" ..	The Irishman (imp.)	Tipperary Bull	Colleen Bawn (imp.)	Berry Farm .	†
Jersey ...	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Yanco Farm ..	*
" ...	Trafalgar ...	Best Man ...	Rum Omelette	Cowra Farm ...	*
" ...	Kaid of Khartoum	Sir Jack ...	Egyptian Belle	H. A. College ..	*
" ...	Bridegroom ...	Best Man ...	Golden Omelette.	Yanco Farm ..	*
" ..	Leda's Retford Pride.	Dinah's Lad ...	Leda's Angel..	Wagga Farm ...	*
Guernsey ..	The King's Mirror	Calm Prince ...	Vivid (imp.)...	Kyogle	4 July, '14.
" ..	Star Prince ...	Calm Prince ...	Vivid (imp.)...	Casino	— Sept., '14.
" ...	Sky Pilot ...	Prince Souvia ...	Parson's Red Rose (imp.).	Maclean	11 July, '14.
" ...	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (6509)	Inverell	5 Oct., '14.
" ...	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	*
" ...	Claudius (imp.)	Golden Star II..	Claudia's Pride (imp.).	Wollongbar Farm	†
" ...	George III ...	King of the Roses	Calm 2nd ...	Mullumbimby ...	31 Mar., '15.
" ...	The Peacemaker	Calm Prince ...	Rose Petersen	Scone	2 July, '14.
" ...	King of the Roses	Hayes' King ...	Rosey 8th (imp.).	Bega	20 June, '14.
" ...	Lauderlad ...	Laura's Boy ...	Souvenir of Wollongbar	Casino	3 Sept., '14.
" ...	Belfast	King of the Roses	Flaxy 2nd ...	Tyalgum	— Nov., '14.
" ...	Royal Preel ...	Itchen Royal ...	Hayes' Lily du Preel (imp.).	Wollongbar Farm	†
" ...	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Frederickton	— Sept., '14.
" ...	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	Paterson-Vacy ..	9 Sept., '14.
Ayrshire ..	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose...	Grafton Farm ..	*
" ...	Wyllieland Bright Lad (imp.)	Wyllieland Gleniffer (7229)	Wyllieland Sangie	Glen Innes Farm..	*
" ...	Isabel's Majestic	Majestic of Oakbank..	Isabel of Gleneira.	Grafton Farm ...	*
Kerry... ...	Rising Sun ...	Bratha's Boy ..	Dawn ...	Bathurst Farm ...	*

*Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed.

Department of Agriculture,
Sydney, 2nd June, 1914

BULLS FOR SALE

AT BERRY EXPERIMENT FARM.

HOLSTEIN.—Colonel Neitenstein (355): date of birth, 26th April, 1912; colour, black and white; sire, Neitenstein, by Hollander; dam, Marjorie, by Chairman; g d Margaretha (imp.), 10,439; dam of sire, Dutch Oven by President. Price, **£15.**

Milk yields of dams :—	Milk lb.	Fat per cent.	Butter lb.
Marjorie	5,030	...	224
Margaretha (imp.)	10,990	...	407
Dutch Oven	8,671	3·6	365

IRISH SHORTHORN.—Irish Boy (577): date of birth, 9th April, 1912; colour, rich roan; sire, Limerick's Lad (imp.); dam, Colleen Bawn (imp.).

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Colleen Bawn	6,937	3·8	309

MILKING SHORTHORN.—Johnny Walker (596): date of birth, 3rd February. 1913; colour, deep red, little white; sire, Imperialist (MS.); dam, Royal Dew, by Royal Hampton (imp.); g d Dewdrop, by Dora's Boy; g g d Lady Fanny, by Lord Sangrave (imp.); g g g d Fanny 78th (imp.); dam of sire, Lady Nancy of Minembah (357). Price, **20 guineas.**

GUERNSEYS.—Mountain Prince (593): date of birth, 12th January, 1913; colour, lemon and white; sire, Calm Prince; dam, Angelica 8th (imp.). Price, **30 guineas.**

Rohais' Lad (601): date of birth, 18th March, 1913; colour, lemon and white; sire, Calm Prince; dam, Rohais' Lassie (imp.). Price, **40 guineas.**

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Rohais' Lassie...	5,537	5·1	333

Othello (605): date of birth, 4th April, 1913; colour, lemon and white; sire, Trengwainton Village Favourite (imp.); dam, Desdemona 8th (imp.). Price, **35 guineas.**

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Desdemona 8th (imp)	6,721	4·3	340

JERSEYS.—Golden Fox (586): date of birth, 7th December, 1912; colour, whole fawn; sire, Xmas Fox (imp.); dam, Golden Omelette, by Sir Jack; g d Rum Omelette 2nd, by Golden Lord; dam of sire, Malvoisie (vol. xx, p. 369), by Gay Boy, 7510. Price, **15 guineas.**

Milk yield of dams :—	Milk lb.	Fat per cent.	Butter lb.
Golden Omelette	3,064	5·6	202 (in 28 weeks)
Rum Omelette 2nd...	5,667	4·4	361

Dancing Fox (552): date of birth, 1st June, 1912; colour, whole fawn; sire, Xmas Fox (imp); dam, Lady Gay, by Sir Jack; g d, Rum Omelette II, by Golden Lord; g g d, Rum Omelette (imp.). Price, **15 guineas.**

AT HAWKESBURY AGRICULTURAL COLLEGE.

AYRSHIRE.—The Corsair (483): date of birth, 6th May, 1911; colour, red and white; sire, Byron, by Auchenbrain Spicy Jock (imp.); dam, Ripple Rose, by Prince Emerald (imp.); g d, Rose Berry, by Mischief Maker of Barcheskie (imp.), 3892; dam of sire, Julia, by Peacemaker. Price, **15 guineas.**

Milk yields of dams :—	Milk lb.	Fat per cent.	Butter lb.
Ripple Rose	7,669	3·9	351
Rose Berry	5,799	4·1	280

BULLS FOR SALE—*continued.*

AT GRAFTON EXPERIMENT FARM.

GUERNSEY.—Storm Prince (2): date of birth, 18th October, 1912; colour, lemon and white; sire, Calm Prince; dam, Angelica of Richmond, by Governor of Conture (826 P.S.); g d, Angelica 8th (imp.). Price, **25 guineas.**

AT WOLLONGBAR EXPERIMENT FARM.

GUERNSEYS.—Royal Preel (imp.): date of birth, 25th May, 1908; sire, Itchen Royal (1,756); dam, Hayes' Lily Du Preel 4th (imp.), 6903 E.S H.B. Price, **45 guineas.**

Otranto (401): date of birth, 4th February, 1913; colour, fawn and white; sire, Hayes' Fido (imp.); dam, Golden May of the Grone (imp.). Price, **35 guineas.**

Milk yield of dam :—	Milk lb.	Butter lb.
Golden May of the Grone (imp.)	5,363	264

Sweetheart's Fido (398): date of birth, 8th March, 1913; colour, dark orange, little white; sire, Hayes' Fido (imp.); dam, Sweetheart, by The Admiral; g d, Souvenir of Wollongbar, by Vivid's Prince; g g d, Souvenir (imp.). Price, **30 guineas.**

Milk yield of dam :—	Milk lb.	Butter lb.
Sweetheart	4,962	255

Game Boy (407): date of birth, 27th July, 1913; colour, fawn and white; sire, Beaucaire's Baby; dam, Dido, by Royal Preel; g d, Miss Clatford (imp.), by Clatford Hope 2nd (1814 E.S.H.B.); g g d, Clatford Hopeful (imp.) (6811 E.S.H.B.). Price, **25 guineas.**

Milk yield of dam :—	Milk lb.	Butter lb.
Dido	5,000	262

GEORGE VALDER, Under Secretary, and
Director of Agriculture.

AN EFFICIENT METHOD OF POISONING FLYING-FOXES.

MR. JOHN H. GRUNSELL, of Mulwaree Gardens, Goulburn, has kindly supplied the Department with the results of his method of poisoning flying-foxes. He says:—

I may say that the flying-foxes have been worse this season than ever I have known before, dating back over thirty years.

As the nights were so dark it was impossible to shoot them, so I had to resort to the poisoning. My crops of apples and pears were very heavy, and the foxes were doing an immense amount of damage.

The method I adopted was to run a thin wire through the core of an apple, then slice off one side and sprinkle it with strychnine. It was then fastened to the highest branch of a tree.

The first night I placed 12 poisoned apples in 8 pear-trees and 4 apple-trees, and destroyed 66 foxes. The second night 16 baits were hung out, and 74 foxes secured. The third night's total was 64, the fourth 36, and the fifth 30 making a total for the five nights of 270. Since the fifth night of poisoning I have only seen an odd fox. There were as many as 8 foxes hanging round one bait.

I am more than satisfied with the results, and recommend any growers who are plagued with the pests to try the method for themselves.

AGRICULTURAL SOCIETIES' SHOWS.

SECRETARIES are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1914.

Society.	Secretary.	Date.
N.S.W. Sheepbreeders' Association (Sydney)	H. N. Bowden	July 1, 2, 3, 4
Wentworth P., A., and I. Society	W. B. Crang	,, 16
Deniliquin P. and A. Society	L. Harrison	,, 16, 17
Narandera P. and A. Association	W. T. Lynch	Aug. 4, 5
Corowa P., A., and H. Society	John D. Fraser	,, 18, 19
Forbes P., A., and H. Association	S. H. Bates	,, 18, 19
Coolamon A. and P. Association	E. Owen	,, 18, 19
Murrumbidgee P. and A. Association (Wagga Wagga)	A. F. D. White	,, 25, 26, 27
Parkes P., A., and H. Association	G. W. Seaton	,, 26, 27
Wellington P., A., and H. Society	A. E. Rotton	Sept. 1, 2
Grenfell P., A., and H. Association	G. Cousins	,, 1, 2
Gunnedah P., A., and H. Association	M. C. Tweedie	,, 1, 2, 3
Manildra P. and A. Association	A. Anderson	,, 2
Germanton P., A., and H. Society	Jas. S. Stewart	,, 2, 3
Albury and Border P., A., and H. Society	W. I. Johnson	,, 8, 9, 10
Ganmain A. and P. Association	J. F. Ashwood	,, 15, 16
Cootamundra A., P., H., and I. Association	T. Williams	,, 15, 16
Cowra P., A., and H. Association	E. W. Warren	,, 16, 17
Murrumburrah P., A., and I. Association	J. A. Foley	,, 22, 23
Temora P., A., H., and I. Association	J. Clark	,, 22, 23, 24
Riverina P. and A. Society (Jerilderie)	J. Kennedy	,, 23
Canowindra P., A., and H. Association	G. Newman	,, 23, 24
Yass P. and A. Association	W. Thomson	,, 30, Oct. 1
Hay P. and A. Association	G. S. Camden	Oct. 6, 7
Hillston P. and A. Society	S. J. Gordon	,, 14
Tweed River Agricultural Society	A. E. Budd	Nov. 11, 12
Lismore A. and I. Society	T. M. Hewitt	,, 25, 26, 27

1915.

Albion Park A., H., and I. Association	M. A. Brown	Jan. 20, 21
Kiama A. Association	G. A. Somerville	,, 26, 27
Wollongong A., H., and I. Association	W. J. Cochrane	,, 28, 29, 30
Shoalhaven A. and H. Association	H. Rauch	Feb. 10, 11
Newcastle A., H., and I. Association	E. J. Dann	,, 10, 11, 12, 13.
Guyra P., A., and H. Association	P. N. Stevenson	,, 23, 24, 25
Uralla A. Association	H. W. Vincent	Mar. 2, 3, 4
Tenterfield P., A., and M. Society	F. W. Hoskin	,, 2, 3, 4
Camden A., H., and I. Society	A. Thompson	,, 3, 4, 5
Glen Innes & Central New England P. & A. Assoc'n	G. A. Priest	,, 9, 10, 11
Tumbarumba and Upper Murray P. and A. Society	E. W. Figures	,, 10, 11, 12
Inverell P. and A. Association	J. McIlveen	,, 17, 18, 19
Goulburn A., P., and H. Society	G. G. Harris	,, 18, 19, 20
Quirindi P., A., and H. Association	H. H. Rourke	,, 23, 24
Upper Hunter P. and A. Association	R. C. Sawkins	,, 24, 25, 26
Crookwell A., P., and H. Society	J. H. Huxley	,, 25, 26

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Agricultural Gazette of New South Wales.

Sheep and Wool for Farmers.

CROSS-BREEDING EXPERIMENTS FOR 1910-11-12-13.

THE WOOL AND MUTTON TYPE.

[Continued from page 469.]

J. WRENFORD MATHEWS.

The Wagga Experiment Farm Results.

THE work may now be reviewed from the four years' results of the lambs and three years' results of the grown sheep at this Farm. These particulars are arranged in serial order, arising from their original source of development. They include:—

(1) Body and fleece weights of all rams used in the trials.

(2) A record of the weight of wool produced by each group of ewes.

(3) Particulars concerning the percentage of ewes assisted, &c., during parturition.

(4) A record of the natural increase.

(5) A tabular statement showing the monthly development during the lamb stage.

(6) Similar information regarding the body and fleece weights of all lambs.

(7) Body and fleece weight of all crosses taken at each shearing between 1 year and 5 months and 3 years and 5 months.

(8) The clean yield results, classification, and value of the wool produced by the different crosses.

TABLE showing Age and Weight of Body and Fleece of all Rams doing service in the tests.

Breed.	No.	1909.			1910.			1911			1912.			1913.		
		Age.	Body	Fleece.	Age.	Body.	Fleece.	Age	Body.	Fleece	Age	Body	Fleece	Age.	Body.	Fleece.
		years	lb.	lb.	years	lb.	lb.	years	lb.	lb.	years	lb.	lb.	years	lb.	lb.
Lincoln	1	3	170	19	4	180	16½	5	206	12¾	1⅓	110	14	2⅓	136	12½
	2	2	140	17	2*	185*	23*	3	136	13	1⅓	114	11	2⅓	132	14
Leicester	1	2	160	17	3	168	12¼	4	181	11¼	5	169	6¼		died.	
	2	..	..	..	3	153	13¼	3	201	11	4	157	8	3	168	9¼
Border Leicester.	1	2	185	10	3	190	10	4	199	8¾	5	176	7	6	179	7¼
	2	2	170	14½	3	175	11½	4	180	10½	5	150	8½		died.	
South Down ..	1	2	140	7	3	148	6									
Shropshire ..	1	3	175	10	3	180	11									
Hampshire ..	1	3	185	10	..	..	..									
Dorset Horn ..	1	3	190	8½	1½	155	8									

* This ram was purchased at auction, and shorn out of season.

The Rams.

The foregoing particulars were in each case taken at the shearing, which precedes the time when the rams were joined with the ewes by about two months. Particulars for 1913, while unimportant, are included in order that a record of the rams, along with the crosses, may be shown for the full term.

Side by side are also given particulars concerning several of the Down breeds. In 1910 a South Down, Shropshire, Hampshire, and Dorset Horn ram each received a dozen ewes. With the exception of the Hampshire, the same breeds had divided amongst them thirty ewes during the following year. Prior to entering upon the present scheme, the Hampshire had been tried, and its rejection was due chiefly to largeness of head and to its having a somewhat cumbersome body. The Suffolk (D_4), another of the heavy-bodied Short-wools, was objected to for similar reasons. Viewed from the standpoint of early lamb production, it is considered worthy of note that any position which either of these breeds would be likely to fill could be more serviceably occupied by either

(*a*) The Shropshire, for quality and shape of carcase, combined with moderately early maturity; or

(*b*) The Dorset Horn, for extra body-weight and extremely early maturity.

The mating, however, of any of these breeds with the Merino is not a practice that commends itself. Indeed, their inclusion here was merely for the purposes of record, in order that their crosses might be compared with those of the Long-wool. Of the four, Wagga was the only farm where the Down sires were used on the Merino.

Variability of Sires.

As the table indicates, a record has been kept for the purpose of noting not only the disposition of the breeds separately, but also for observing any peculiarities amongst the rams of the various breeds themselves. With some breeds it was found necessary to change the rams rather more frequently than the usual period of service would require. This was chiefly because of their indifference in respect of breeding.

The conclusions of the five-years' tests, coupled with experience with these breeds under similar climatic conditions, points to the fact that among the Long-wools the Lincolns and Leicesters are the chief defaulters in this respect. So far as the Long-wools are concerned, taking the Wagga results as a guide, it appears that the condition is largely influenced by the amount of wool characteristic of the breed. For example, the Lincoln appeared a less ready breeder than the Leicester, though there was little to choose between the two. Representing the lighter-woolled variety, the Border Leicester is brought into prominence. This is fully justified by the results. These differences are shown in the tables, which not only give the period of service afforded by the rams of the different breeds, but also show the order of grouping.

In comparing these records, the nature of the seasons should be strictly kept in mind, as this obviously influences the results, not only in respect of the particulars of the sires but in their crosses as well.

In connection with the Leicester, it was noted that more black lambs resulted from the use of rams of this breed than of any other Long-wool. In fact, it was the only breed with which such variations seemed to be more than chance happenings. On the average, approximately, 8 per cent. of lambs of this colour were dropped each year. Observations gathered from outside sources confirm this as being seemingly predispositional in the Leicester, due probably to a "throw-back" or reversion to some ancestor.

In competition with the other Long-wools, the Border Leicester behaved with marked consistency throughout, and this is corroborated by experience under similar conditions elsewhere. Though the rams were two years old when first placed with the ewes, they were as vigorous during the later as they were in the earlier stages of their career. The success of the breed in this respect marks a disposition, until recently apparently unobserved in the use of British breeds. It indicates that the lighter woolled the breed is, the greater the activity it displays as a breeder under semi-arid conditions. Another instance of this is shown in the Dorset Horn, which is also a light-fleeced breed. Like the Border Leicester, the Dorset Horn exhibits the pink skin and characteristic white face and legs. Besides being a ready breeder during the early stages, its virility appears, as compared with many other of its compatriots, to be less impaired with age.

A marked feature of the Border Leicester is the consistency with which it retained its weight of fleece. Contrary to expectations, there was shown less variation in fleece weight than in the case of any other Long-wool for a corresponding period, despite the fact that the seasons were variable. The rams were kept strictly under natural conditions, and were bred from until five, and in one instance six, years of age. A perusal of the table will show, too, that the breed suffered in no wise by comparison in body weight. Indeed, for hardiness and all-round adaptability, none ranks superior among the Long-wools. Whether these qualities will be borne out in the crosses evolved from it depends entirely upon what they will return from wool and mutton, as viewed from a monetary standpoint.

The Effect of Early or Late Maturing on Fleece Production.

With the object of ascertaining what effect early or late maturity, as represented in the breeds mentioned, would have in relation to the ewes rearing lambs, those constituting the different groups and apportioned to the different breeds were equally divided, and a record of the fleece weight was taken separately. In tracing the predominating influences of the different sires, and the effect which the rearing of their progeny has on the condition of the ewe subsequently, this may be of significance.

Previous discussion on breeds and their development has shown that, in order to enable Nature to spend herself generously in any one particular, a comparative limitation is always associated, or an economising effect is

necessarily exercised in some other direction. The Merino ewe, even at her best, is noted for paucity of milk. Thus, for Merino ewes to raise lambs to vigorous early-maturing British breeds, there is occasioned a severe strain on her constitution, much more than that which would be occasioned in rearing lambs to a ram of her own breed. According to the vigour of the lamb, so in like proportion is the physical vigour reduced in the ewe, and the weight of fleece necessarily diminishes—even allowing that the characteristics of the sire are only partially retained in the progeny.

Unfortunately, however, owing to the variability of the seasons, and to the fact that during one year the ewes missed to the rams of one of the breeds (Lincolns), the results are not as conclusive as they otherwise might have been.

TABLE showing Weights of Fleeces of Merino Ewes rearing lambs sired by rams of various breeds.

Group with—	No.	1911. Average Fleece Weight.	No.	1913. Average Fleece Weight.
		lb. oz.		lb. oz.
Lincoln	47	8 10	58	9 3
Leicester	53	9 7	60	8 9
Border Leicester	66	9 2	62	8 8
South Down	11	9 1		
Dorset Horn	10	8 9		

TABLE showing the difference in Fleece Weight between Ewes rearing lambs and those remaining empty for the years mentioned.

Year.	Wet.		Dry.		Difference in average Weight of Fleece.
	No.	Weight of Fleece	No.	Weight of Fleece.	
		lb oz.		lb. oz.	lb. oz.
1911	187	8 14	23	9 4	0 6
1912	133	5 7	64	6 14	1 7
1913	180	8 12	5	9 12	1 0

Touching on the results in the earlier table, whilst those for 1911 show slight inconsistency, the returns for 1913 are quite in accordance with the earlier and later maturing qualities characteristic of the breeds represented. For example, the 8 lb. 8 oz. of fleece produced by the group mated with Border Leicester in 1913, and the 8 lb. 9 oz. produced by those mated with Dorset Horn rams in 1911, are indicative of the more rapid development of the lambs dropped to these breeds, as compared with those dropped to the others for the corresponding periods.

The Natural Increase.

Viewed in the broader sense, this constitutes one of, if not actually, the most important of all the aspects that come within the scope of the investigations.

Because of the difficulty often experienced by Merino ewes in "lambing down" to the larger-framed British breeds, special attention has been directed to the recording of this condition. Observations have been taken, not only with respect to the rate of increase, but also as to which of the breeds caused the most trouble at the time of parturition. Two sets of tables have, therefore, been arranged, viz. :—(*a*) Setting out the percentage of lambs dropped each year; and (*b*) the number of ewes that died; also those assisted during this particular period.

TABLE showing, for comparative purposes, the number of ewes assisted, also the percentage of deaths before, at, and after parturition; as well as the number of lambs that died before and after marking, as a result of mating different British breeds with the Merino.

Breed of Ram.	No. of Ewes Mated.	No. of Ewes Assisted.	Deaths of Ewes—Parturition.			Deaths of Lambs—Marking.		Ewes.	
			Before.	At.	After.	Before	After.	Percentage Assisted	Percentage Lost.
				Year 1910.					
L_1	50	4	..	1	1	..	1	8	4
L_2	52	5	2	1	1	...	1	9·6	4
L_3	50	4	...	...	...	......	..	...	......
D_1	12	......	...	...	...	......	...	......	...
D_2	12	......	..	...	1	...	..	...	8
D_3	12	4	...	1	1	1	...	33·3	16·6
D_5	12	......	...	...	...	....	1	.....	.....
				Year 1911.					
L_1	66	1	...	1	...	.....	2	1·5	1·5
L_2	67	2	...	1	...	......	2	3	3
L_3	67	2	...	...	...	.....	1	3	......
D_1	12	......	..	...	...	...	...	.....	.....
D_2	12	......	...	..	...	.....	...	....	....
D_3	13	3	...	...	...	.....	...	23	....
				Year 1912.					
L_1	68	1	1	...	...	.....	...	1·6	1·6
L_2	69	1	1	...	3	.....	..	1·4	5·9
L_3	67	4	1	...	...	......	2	7	1·5
				Year 1913.					
L_1	63	16	..	...	...	Twins 7, Died 9	1	25	......
L_2	64	2	1	2	1	Twins 2, Died 6	2	3	6·25
L_3	33	9	...	...	...	Twins 2, Died 7	...	14	......

Whilst all British breeds stand more or less at a disadvantage in respect of the disability of the ewe, the trouble may, to a large extent, be obviated by selecting the larger-framed type of Merino ewe. The difficulty, in most instances is attributable to at least two main causes. Generally, from the largeness of the head is said to arise the more serious form of disability. However, observations disclose that just as much and, in the case of some breeds, greater trouble is experienced through the fullness of the shoulder.

These constitute the two more serious forms of disablement where the presentation is a natural one. However, there arise innumerable instances where ineffective delivery is caused through the fœtus being abnormal, or the presentation otherwise a false one. In all cases, whether due to head or shoulder development, the position of the fœtus and the nature of the presentation should always be first ascertained. This may be ascertained by the position of the head. The head should always come first, the nose slightly to the fore, with the jaws resting between the fore feet, and assuming a natural position. If in this way the point of the muzzle and the two fore feet only be visible, and delivery is further delayed, then it is almost certain that the head is the cause of such delay. On the other hand, if the head be well exposed, the feet and limbs in natural position, almost assuredly the shoulder is preventing expulsion. The whole trouble with parturition may be attributed to a violation of Nature's laws, in expecting a small framed Merino ewe to deliver a progeny to a ram of larger dimensions than her own breed. This is evident in the narrowness plainly seen in the width across the hips, viewed externally; but owing internally to the comparative smallness of the bony structure of the pelvis. While at times there may be room for the head to pass, the narrow passage is incapable of sufficient expansion to release the shoulders. Whichever form of difficulty is experienced, it can generally be traced to the difference in the conformation of the particular breed. If the breed be the squarer and broader-bodied type, like the Border Leicester, for instance, then trouble invariably lies with the shoulder. If, again, the breed more closely resembles the Lincoln in size and general construction of frame, the head is found to be chiefly the main cause of difficulty In fact, realising that the Lincoln mainly finds its use in Australia for mating with the Merino, breeders have attempted to obviate this difficulty by breeding a type with a smaller head This, however, did not meet with the success that was anticipated It was not generally understood that the size and shape of the head is but an indication of the conformation and total construction of frame and body. To reduce or in any way alter the shape of the head, means a modification of each component and structural part underlying physical development. The result, as it was, exercised a deteriorating influence, and if pursued further would, undoubtedly, with a heavy-woolled breed like the Lincoln, have proved fatal. Naturally, the type became lighter in bone, and, as a consequence, weakened in constitution.

Comparing the breeds under review, it was thought that the Leicester would have caused less trouble than any other in this connection, owing to its smaller head and lighter bone. Looking at the results, however, it will be seen that the percentage of losses was actually greater with this breed than with either Lincolns or Border Leicesters. This is hard to account for, unless it be due to the breadth of rib and depth of body, which is a prominent development in the Leicester. It can hardly be attributed to the fulness of shoulders, as these are scarcely as well developed in the cross as in the case of the Border Leicester, where the losses were smaller.

Head of Lincoln, showing light forelock.

Head of Lincoln, showing heavy forelock.

Front view of English Leicester.

Profile of English Leicester.

Profile of Border Leicester.

Profile of Romney Marsh.

Romney Marsh.

THE CONFORMATION OF THE HEAD IN VARIOUS BRITISH BREEDS OF SHEEP.

Regarding the Border Leicester, though noted for its comparative smallness, yet the head of that breed is not as small as would appear from a cursory glance. What attracts attention, and has probably caused preference to have been given to this breed over all others for the purpose indicated, is the slightness and sharpness of features apparent in the prominence of the frontal and nasal pieces. Closer examination will, however, disclose that the dimensions of the head of the Border Leicester are as great, if not greater, than those in most breeds. The head is certainly larger than that of the Leicester, though smaller than that of the Lincoln and Romney Marsh, which are probably the largest-headed of all British breeds. As the accompanying illustrations portray, the face is as long, in fact longer than in most breeds, but any difference is shown in the comparative slightness and less prominence in the depth of the lower jaw.

The following table of measurements indicates fairly clearly the size and formation of head distinguishable in the different breeds.

In addition to those breeds used in the trials are included one or two others which were on the Farm.

Breed	First Measurement	Second Measurement
	Inches.	Inches.
Lincoln	$12\frac{1}{4}$	$20\frac{3}{4}$
Leicester	11	$19\frac{3}{4}$
Border Leicester	12	20
Romney Marsh	11	$21\frac{1}{4}$
Devon	12	22
South Down	$9\frac{1}{2}$	$20\frac{3}{4}$
Shropshire	$10\frac{3}{4}$	$21\frac{3}{4}$
Dorset Horn	13	23
Grade L_1M	12	21

The first measurement was taken from the crown of the head, level with the front of the ears, straight down over the forehead to the bottom of the nasal division (muzzle). The second measurement was taken around the head immediately in front of the ears, and is round the deepest portion of the jaw.

The appended table gives a record of the lambing percentages as the result of four years' mating the breed named with the Merino.

TABLE showing the Percentage of Increase from the Merino ewes with which were mated the various British breeds.

Year 1910.

Breed of Ram.	Breed of Lambs.	No. of Ewes Mated.	No. of Lambs Marked.	Percentage of Lambs.	Remarks.
Lincoln	L_1M	50	33	66	Date of mating, 13th December, 1909. Period of lambing, June principally. Date of marking, 18th July, 1910
Leicester ...	L_2M	52	32	61·5	
Border Leicester.	L_3M	50	39	78	
South Down ...	D_1M	12	11	91·5	
Shropshire ...	D_2M	12	9	75	
Hampshire ...	D_3M	12	11	91·5	
Dorset Horn ...	D_5M	12	9	75	

TABLE showing the Percentage of Increase, &c.—*continued.*

Breed of Ram.	Breed of Lambs.	No. of Ewes Mated.	No. of Lambs Marked.	Percentage of Lambs.	Remarks.
		Year 1911.			
Lincoln	L_1M	66	48	72 7	Date of mating, 28th December, 1910. Period of lambing, June principally. Date of marking, 1st August, 1910.
Leicester .	L_2M	67	56	85·5	
Border Leicester.	L_3M	67	58	86·5	
South Down ...	D_1M	12	11	91	
Shropshire ..	D_2M	12	1	8	
Dorset Horn ...	D_5M	12	10	83	
		Year 1912.			
Lincoln	L_1M	68	3	4·4	Date of mating, 13th December, 1911. Period of lambing, June principally. Date of marking, 12th July, 1912.
Leicester ...	L_2M	6.)	47	72	
Border Leicester.	L_3M	67	44	66·7	
		Year 1913.			
Lincoln	L_1M	63	49	77	Date of mating, 11th December, 1912. Period of lambing, May and June. Date of marking, 2nd July, 1913.
Leicester ...	L_2M	64	55	87	
Border Leicester.	L_3M	63	55	85	

Comparing this with the table on page 557, the Border Leicester is again shown to advantage. Whereas for the Lincoln and Leicester breeds respectively, the returns show on the average an increase of 55 per cent. and 75 per cent , those for the Border Leicester, worked out for the full term, show a 79 per cent. increase.

The figures for the Down breed are also included, but these are unimportant, and show merely the record of their presence amongst the ewes.

The failure of the Lincoln in 1912 places that breed at a disadvantage in the compilation of the averages.

The lower return for 1912 was due to the conditions prevailing during the lambing season of that year. The lambs were "marked" when about a month old.

The figures given for the number of ewes that died include only those dying during parturition. Mortality occurring before and after this period does not appear in these returns. The greater number assisted during 1910, as compared with other years, is probably due to the ewes then being younger, and to the fact that the draft included a fair proportion of maiden ewes. Indeed, in most instances where assistance was necessary, it was in the case of maiden ewes.

The Lamb Stage.

With the lamb marketable at the age of about five months, the object has been to furnish a complete record, tracing development along all stages.

The records are taken up to when the lamb was taken from the mother. Down crosses are again shown side by side with the Long-wools for the first two years, for the purposes of comparison.

As regards what rightly constitutes a lamb as distinct from a sheep of approximately the same age, some definite distinction appears necessary. Young sheep are frequently marketed at various ages after weaning, and still represented as lambs. This is undoubtedly misleading to both buyer and those acting on behalf of the seller. Buyers and consumers alike discriminate between lamb and what is really partially-matured mutton. Therefore, in view of these special market requirements and the different values ruling for these, once a sheep has developed beyond the "sucking" period it should cease to be classed as lamb. A more correct and convenient term is "weaner," signifying that the youngster has passed beyond the stage when it receives any nourishment from the mother. As such it may be conveniently designated till reaching about the ten months' stage, when, for the intervening period until shorn, it should be called "hogget."

The idea of catering for specific demands with special breeds or crosses has so far not attracted the attention of those engaged in the mutton and lamb industry to the extent that it should have done. However, with the enormous possibilities attending further development of these branches of the sheep industry, any means of improvement of existing methods is worthy of consideration. The general disposition amongst those so engaged is to favour the cross that will thrive tolerably well in the locality, and from which there is, perhaps, obtained a fairly remunerative return, without considering how they might increase their immediate profits by endeavouring to meet these demands. Assured of a profitable clip of wool should it be necessary to hold the cross beyond the weaning stage, breeders as a rule pin their faith to the first cross, as it is the most valuable general-purpose class. Admitting, for combination of lamb and mutton requirements, that it would be difficult to recommend any cross superior to it, yet it should be understood that the best interests of the export trade are not being considered by the marketing of these first crosses (LM) as suckers. Lacking in shape and weight, first crosses do not tend to raise the standard of our lamb product abroad. As compared with second crosses (DLM combinations) they are the equal neither in shape, weight, nor early maturity. Still it must be realised that in some districts, where lamb-raising is attempted under somewhat variable conditions, the circumstances are such as to preclude the use of second crosses almost entirely, because of the unprofitableness of the fleece. Where such conditions exist, breeders have no alternative but to resort to first crosses.

The records are presented with the object of conveying all information possible in this connection. Two sets of tables have been compiled, namely, one showing a record of monthly development about the sucking period, and the other a record of body and fleece weights taken at the time of shearing; wether lambs being shown separately from ewe lambs.

TABLE showing a record of development in the lambs, taken at monthly intervals from the time of "marking," and continued till after the weaning period.

1910.

Cross.	Class	No.	Body Weight on— July 15. lb.	oz.	August 15. lb.	oz.	September 15. lb.	oz.	October 15. lb.	oz.
L_1M ...	Ewes ...	17	23	11	34	2	49	0	62	0
	Wethers ...	15	32	10	38	0	53	0	69	4
L_2M ...	Ewes ...	18	21	8	31	3	44	0	56	7
	Wethers ...	13	24	8	34	0	49	5	62	1
L_3M ...	Ewes ...	26	23	13	35	0	50	2	67	7
	Wethers ...	13	23	9	34	9	49	12	64	11
D_1M ..	Ewes ...	6	23	8	33	5	45	3	57	0
	Wethers ..	5	24	0	32	6	45	3	57	0
D_2M ..	Ewes ...	2	27	0	37	5	50	0	62	8
	Wethers ...	6	24	5	35	10	50	0	63	0
D_3M ..	Ewes ...	4	21	8	30	12	45	0	57	8
	Wethers ...	6	23	2	35	0	48	10	61	2
D_5M ..	Ewes ...	1	24	0	36	0	47	0	59	0
	Wethers ...	7	28	4	39	0	48	10	68	9
1911.			July 31.		September 1		September 30.		October 30.	
L_1M ...	Ewes ...	19	30	0	43	8	55	0	62	0
	Wethers ...	27	33	0	48	4	63	0	73	8
L_2M ...	Ewes ...	26	31	5	43	8	54	8	62	8
	Wethers ...	28	37	0	45	0	60	8	67	0
L_3M ...	Ewes ...	30	29	11	43	8	54	0	62	8
	Wethers ...	27	33	11	47	12	61	0	72	8
D_1M ..	Ewes ...	5	28	8	42	0	50	0	58	0
	Wethers ...	5	30	12	43	8	54	0	64	8
D_2M ..	Ewes ...	1	13	8	32	0	50	0	63	0
D_5M ..	Ewes ...	7	33	0	47	0	58	0	71	0
	Wethers ...	4	38	0	53	8	64	8	72	8
1912.			July 11.		August 9		September 6.		October 3.	
L_1M ..	Ewes ...	3	13	4	19	0	30	0	45	0
L_2M ...	Ewes ...	24	15	12	19	4	29	8	45	4
	Wethers ...	23	16	8	19	4	31	4	47	12
L_3M ...	Ewes ...	26	16	4	19	12	31	0	46	12
	Wethers ...	16	15	12	19	12	31	8	48	8
1913.			July 1.		August 4.		September 1.		October 2.	
L_1M ...	Ewes ...	24	29	6	48	1	55	12	61	8
	Wethers ...	25	32	4	49	2	61	8	68	13
L_2M ...	Ewes ...	27	28	12	39	14	55	1	62	12
	Wethers ...	28	31	4	45	8	56	13	65	6
L_5M ...	Ewes ...	29	29	1	46	7	58	2	66	9
	Wethers ...	26	34	5	49	13	61	15	72	1

Contrasting one year with another (excepting 1912), the results taken collectively are fairly uniform. Comparing the various crosses, however, consistently lower averages are to be seen for the Short-wools as against the Long-wool crosses, with the exception of the Dorset Horn, which can always be relied upon to furnish a progeny above the ordinary in body-weight. Amongst the Long-wool crosses the Border Leicesters have again asserted their superiority for every year excepting 1911, and in this year they practically tied with the Lincoln crosses.

Worked out for the full term, and inclusive of both wethers and ewes, the following record shows the combined averages for the different Long-wool crosses:—

Cross.	Body Weight. lb.	oz.
L_1M	60	11
L_2M	57	5
L_3M	62	9

It will now be interesting to contrast these with similar records which are given for the same crosses, but showing body and fleece weights.

The appended table contains these particulars in detail.

Table showing the Body and Fleece Weights of the different Crosses, taken at the final weighing—the first shearing.

Cross.	Class.	No.	Body Weight. Average. lb.	oz.	Body Weight. Mean of Wether and Ewe. lb.	oz.	Fleece Weight. Average. lb.	oz.	Fleece Weight. Mean of Wether and Ewe. lb.	oz.
	Year 1910.		Age, 18 weeks.							
L_1M ..	Wethers	15	66	4	62	14	3	0	2	14
	Ewes...	17	59	8			2	12		
L_2M ...	Wethers	13	59	3	56	8	2	14	2	12
	Ewes...	18	53	13			2	10		
L_3M... ..	Wethers	13	62	0	63	7	2	11	2	10
	Ewes...	25	64	14			2	9		
D_1M... ...	Wethers	5	54	7	54	10	2	9	2	5
	Ewes..	6	54	14			2	2		
D_2M... ..	Wethers	6	60	10	60	7	2	6	2	5
	Ewes	2	60	4			2	4		
D_3M... ...	Wethers	6	58	14	57	1	2	4	2	3
	Ewes	4	55	5			2	3		
D_4M... ...	Wethers	7	66	8	61	12	2	1	2	0
	Ewes...	1	57	0			2	0		
	Year 1911.		Age, 16 weeks.							
L_1M... ...	Wethers	10	70	4	64	13	3	4	2	14
	Ewes...	19	59	7			2	9		
L_2M... ...	Wethers	8	63	15	61	15	3	1	2	13
	Ewes...	26	59	15			2	9		
L_3M... ...	Wethers	10	69	9	64	12	2	15	2	11
	Ewes...	30	60	0			2	8		
D_1M... ...	Wethers	2	62	8	60	4	2	0	2	0
	Ewes...	2	58	0			2	0		
D_3M... ...	Wethers	1	48	8	......		1	8	......	
			(12 weeks)							
D_4M... ...	Wethers	3	69	15	70	7	2	9	2	6
	Ewes...	1	71	0			2	4		

TABLE showing the Body and Fleece Weights, &c.—*continued.*

Cross	Class.	No.	Body Weight		Fleece Weight.	
			Average.	Mean of Wether and Ewe.	Average.	Mean of Wether and Ewe.
	Year 1912.		**Age, 16 weeks.**			
			lb. oz.	lb. oz.	lb. oz.	lb. oz.
L_1M... ..	Ewes	3	45 0	......	1 13	......
L_2M... ...	Wethers	23	47 12	46 8	1 15	1 15
	Ewes	24	45 4		1 15	
L_3M... ...	Wethers	16	48 8	47 10	2 2	2 2
	Ewes...	26	46 12		2 2	
	Year 1913.		**Age, 16 weeks.**			
L_1M	Wethers	8	71 5	65 10	3 15	3 11
	Ewes	25	59 15		3 8	
L_2M	Wethers	8	69 15	64 12	3 15	3 9
	Ewes...	26	59 9		3 3	
L_3M... ..	Wethers	8	77 0	70 4	3 8	3 4
	Ewes	29	63 9		3 0	

In 1911 the balance of the wether lambs were exported (see *Agricultural Gazette*, March, 1913). Again, in 1913 the balance of the number, as shown in the above Table, was sold with the object of testing their value with the second crosses, report on which will appear later.

In 1910 the weight of fleece produced by the ewes was not recorded. The averages given have, for this year, been estimated. A full record of the crosses for every year, excepting 1912, is, however, available for comparison. The failure during 1912 was occasioned by the infertility of the Lincoln.

Worked out as in previous instances for the full term, the following records show the average body and fleece weight, exclusive of the Downs :—

Cross.	Body Weight.	Fleece Weight.
	lb. oz.	lb. oz.
L_1M	58 6	2 13
L_2M	56 4	2 11
L_3M	60 1	2 9

Comparing again the individual crosses one with another, it will be noticed that whilst the Border Leicester shows consistently to advantage in respect of body weight, and the Lincoln is superior in fleece production, the Leicester is below either in each respect. The Leicester, however, shows to slight advantage over the Border Leicester in weight of wool; though that amount is not as high as might have been expected, considering the difference in the original weight produced by the representative sires.

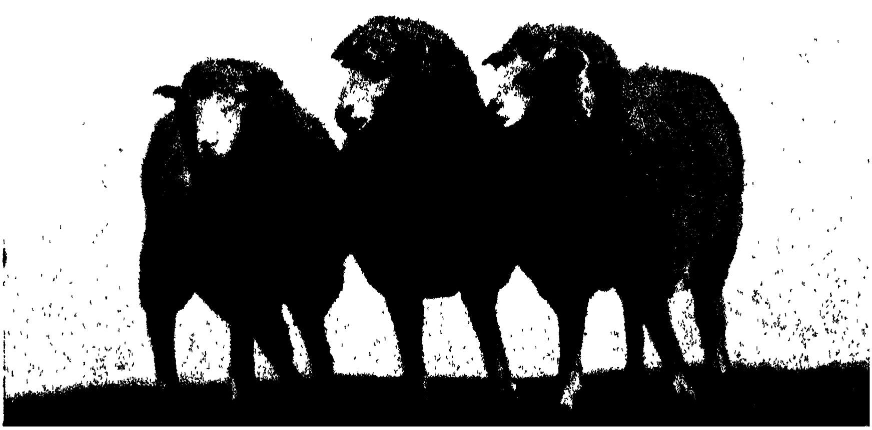
The following gives the average body and fleece weights of all Long-wool sires that were used, and summarised from the table on page 553.

Grouped in their respective order of breed, the averages cover the whole period 1909 to 1912 inclusive.

Breed.	Body Weight.	Fleece Weight.
	lb. oz.	lb. oz.
Lincoln	155 2	16 6
Leicester	168 6	12 2
Border Leicester	178 2	10 1

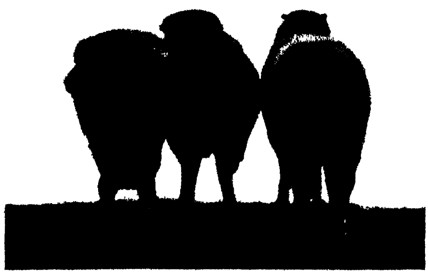
Lincoln-Merino crosses. 1 year.

Leicester-Merino crosses. 1 year.



Border Leicester-Merino crosses. 1 year.

Lincoln-Merino crosses. 2 years.



Leicester-Merino crosses. 2 years.

Border Leicester-Merino crosses. 2 years.

The table showing the body and fleece weights of the cross-breds, perhaps, is the most significant table of all yet presented in the recording of the trials. It showed that the Lincoln furnished a progeny which in body-weight was, on the average, 2 lb. 2 oz. heavier than that of the Leicester, and only 1 lb. 11 oz. lighter than the Border Leicester crosses, despite the fact that the Lincolns' body-weight averaged 13 lb. and 23 lb. lighter than either of these two breeds respectively. These differences are shown in the combined averages which gives body inclusive of fleece.

Again, with regard to the fleece weights, though the Border Leicester itself appeared somewhat at a disadvantage originally as the Lincoln did in body, still only 4 oz. and 2 oz. separated its progeny from the Lincolns and Leicesters respectively, though too much importance cannot be attached to the difference at this stage Doubtless a wider distinction will be shown when the sheep have been allowed sufficient time to develop.

The Wool and Mutton Combination.

Proceeding, we will now analyse the results which have been furnished for the succeeding periods

Here, for review, are the records following on from the first shearing and each year respectively, until the sheep were 3 years and 5 months old, and for the years 1911, 1912, and 1913 respectively.

Thus, there are for comparison the same crosses for 1911 at the age of 1 year 5 months, for 1912, at the ages of 1 year 4 months and 2 years 5 months; and for 1913, at the ages of 1 year 4 months, 2 years 4 months, and 3 years 5 months, wethers again being shown distinct from ewes.

The table distinguishes between the different crosses, and shows, for the years mentioned, a record of the body and fleece weights.

TABLE showing the relative Body and Fleece Weights of the wethers included in the "first crosses.

Cross.	No of Sheep	Body.					Fleece Weight	
		Weight		Measurements				
				Length	Girth	Waist		
1 year 5 months.		Year 1911.						
		lb.	oz	inches.	inches	inches	lb.	oz.
L_1M .	5	115	0	30½	36	39	13	9
L_2M .. .	5	104	0	31	36	39½	12	1
L_3M	5	114	0	32¼	36½	40	12	8
D_1M .	3	86	0	28	33	36⅝	7	5
D_2M	4	107	0	31¼	36	39	9	3
D_3M .. .	4	105	4	31¼	35	39	11	0
D_5M	5	117	0	32½	37	41¼	8	9
1 year 4 months.		Year 1912.						
L_1M	10	67	12	28	30½	34	7	15
L_2M	10	65	0	28	30	31¾	7	4
L_3M	10	74	0	28¾	30½	33	7	2
D_1M	3	62	8	27¾	29¼	31	6	0
D_2M	1	65	0	27	29	32	5	4
D_5M	3	73	0	30¼	33⅞	33¼	5	12

TABLE showing the relative Body and Fleece Weights, &c.—*continued.*

Cross.	No. of Sheep.	Body. Weight.		Body. Measurements. Length.	Girth.	Waist.	Fleece Weight	
2 years 5 months.		**Year 1912.**						
		lb.	oz.	inches.	inches.	inches.	lb.	oz.
L_1M	5	112	0	31½	35½	38½	10	5
L_2M	4	99	0	30½	35¼	37	9	9
L_3M	4	113	0	32¼	35¼	38½	9	13
D_1M	3	88	0	28½	34	38	7	12
D_2M	3	103	0	30	35	38½	8	6
D_3M	3	107	0	31½	35¼	39	8	9
D_5M	3	118	0	32½	36	39½	8	5
1 year 4 months.		**Year 1913.**						
L_1M	...	......	...	......	......	......	....	
L_2M	6	101	5	31½	36¼	40¼	11	0
L_3M	7	110	13	32½	35½	39	10	12
2 years 4 months.								
L_1M	9	134	7	34½	38½	44	13	14
L_2M	9	123	3	32¼	38¼	42	12	12
L_3M	9	129	13	33½	39¼	42¾	12	8
D_1M	3	117	0	32½	37	41½	8	14
D_2M	1	131	0	33½	40	44½	8	4
D_5M	3	132	10	33	40½	42½	9	2
3 years 5 months.								
L_1M	4	161	8	36¼	42¼	44¼	14	15
L_2M	3	140	5	34¼	42	44½	14	2
L_3M	3	168	10	35½	43¾	46½	14	6
D_1M	2	125	0	32	39½	43½	11	6
D_2M	3	145	5	33	42	45½	11	13
D_3M	3	148	5	34½	42	46	13	1
D_5M	3	163	10	35½	42¼	47	10	12

TABLE showing the relative Body and Fleece Weights of the ewes comprising the "first crosses."

Cross.	No. of Sheep.	Body Weight.		Fleece Weight.	
Year 1911.					
1 year 5 months.					
		lb.	oz.	lb.	oz.
L_1M	17	105	0	12	6
L_2M	19	92	0	10	14
L_3M	24	115	0	11	10
Year 1912.					
1 year 4 months.					
L_1M	18	63	4	7	5
L_2M	21	62	0	6	14
L_3M	28	64	0	6	15
2 years 5 months.					
L_1M	16	62	0	7	13
L_2M	24	53	0	7	11
L_3M	23	65	0	6	4

Cross.	No. of Sheep.	Body Weight.		Fleece Weight.	
Year 1913.					
1 year 4 months.					
		lb.	oz.	lb.	oz.
L_1M	2	81	8	....	
L_2M... ...	24	85	11	10	2
L_3M... ...	26	94	9	9	14
2 years 4 months.					
L_1M... ..	16	88	14	11	2
L_2M... ...	21	99	13	11	0
L_3M... ...	27	97	4	10	12
3 years 4 months.					
L_1M... ..	15	105	3	11	4
L_2M... ...	10	100	8	10	11
L_3M... ...	25	117	8	11	14

Conformity in the Cross.

Besides testing the breeds from the standpoint of wool and mutton, the object has been to see in which of the crosses could be found a combination the most equable in conformation. This point, which is regarded of the greatest importance in the breeding of pure-bred flocks, has been almost entirely overlooked in the raising of cross-breds. No doubt, as those experienced know, this is most difficult to secure in a mixed breed. In the mating of two distinct breeds there is liable to be involved a result, the success of which is largely problematical, unless proceeding on the soundest practical lines.

Unlike pure-breds, representative cross-breds invariably do not possess, in a like proportion, all that is characteristic of the parents. In fact, it is only by a careful comparison of the resultant strains and a definite knowledge of the identical features of the breeds which produced them, that the variations can be detected and their relative merits accurately determined. Then again there is no gainsaying the fact that what attracts the eye universally commands more attention from the prospective purchaser than where irregularity and dissimilarity exist.

It has come prominently under notice that the sheep most even in body produces (of whatever its kind) the best class of wool.

In noting the progress of the present trials, this connection has been observed more plainly in those breeds where development is simultaneous, or along lines somewhat parallel. Apparently there exists a close relationship between conformity and early or late maturity as represented by the various crosses. Generally it was discovered that symmetry, uniformity, and evenness of type were displayed with greater regularity and with more marked consistency in those combinations of the later as compared with the earlier breeds. Evidence of this was depicted in the L_1M (Lincoln) crosses, though by comparison the tendency was less marked in the younger than in the older sheep.

The Border Leicester (L_3M) crosses furnished, generally, a fairly uniform class, but it cannot be said that conformation was as regular here as with those representative of slower development. The Merino itself is slow to develop, and so is the Lincoln as compared with other Long-wools. This probably accounts for the greater uniformity apparent in the cross.

Contrary, though, to what is characteristic of the L_1M crosses, those of the Border Leicester (L_3M) showed much to advantage in respect of uniformity in the earlier (or lamb) stage; yet not without consistency as regards the earliness of the sire.

Then, again, it was conspicuously noticeable how prominently the features of this breed were marked in a great number of the stock, and, perhaps, more so than in the relationship of either of the other two breeds. Preponderating in the younger sheep, especially in the lambs, this appeared hardly as pronounced as the sheep grew older, although it was still clearly distinguishable. Why there should have been a marked difference at this

period, or any more in one breed than in another, is rather difficult to comprehend, unless it be due to the vigor and earliness characteristic of the Border predominating in the cross, and enabling it to exert its influence at an earlier stage.

As regards the Leicester, greater dissimilarity was seen here than with either of the other crosses. This is rather surprising considering what a valuable acquisition to the Long-wool group the Leicester has always appeared to be. Still, its partial failure only goes to show the necessity for breeds to be tested on a reliable and comparable basis. Further, there is illustrated how a breed, when mated with another and perhaps of quite the opposite type, may beget a progeny exhibiting dissimilarities and presenting variations from both parents. This is precisely what has occurred in the instance of the combinations evolved from the Leicester. Though being itself one of the most perfect in conformation of all British breeds, yet, mated with the Merino, it yields a progeny defective in some of its more essential particulars. This was most strikingly shown in the recedence of the chest and the general lack of development of those parts surrounding the neck and forequarters. The reason of this may perhaps be better understood from a comparison of the two breeds—namely, Leicester and Border Leicester—which strains, though closely related, yet present features varying structurally. Both breeds undoubtedly stand pre-eminent amongst Long-wools as exhibiting in form all that could be desired so far as depth of rib, width of back and loin, and fulness of hindquarters are concerned. Still, there are other important variations. The Leicester is rather more compact than the Border Leicester, which is altogether larger in body, and is likewise proportionately developed. The most striking difference noticed between the Border Leicester and the Leicester lies in the enlargement and prominence of the brisket and those parts assisting this development, chiefly the breast bone. Whereas in the Leicester this recedes from the under part of the neck, which is short, and ends practically in a line with the fore-legs, in the Border Leicester it projects from the under portion of the body in advance of the fore legs and is of a perpendicular formation, thus giving a more evenly balanced forequarter and a rectangular outline On examination the Merino will be more or less deficient in this particular, and to mate the Leicester with it obviously, and has been proven practically, results in accentuating this defect. Moreover, the object of testing these breeds on the Merino is, whilst incorporating its superior wool-producing qualities, to obtain in the cross something superior from the mutton standpoint, and so remedy, as far as possible, any disabilities that may be present in the Merino.

Although of little value from a close study of conformation, yet the measurements which are contained in the table furnish fairly consistent evidence on the point. They particularise between (1) length; (2) depth; and (3) width of body, as illustrated from (*a*) first joint of neck to root of tail; (*b*) around girth and over wither; (*c*) middle of back, around ribs. The measurements are for wethers only, which have been recorded for the different ages. They represent the proportions in the manner indicated, and

were taken after the sheep were shorn. They also indicate in what particulars the L_3M crosses show to advantage over the other breeds. This, as a glance at the figures will show, is represented in the measurements which illustrate the length, width and depth of back, and breadth of loin. Though little distinguishes between the other two crosses, yet whatever difference is exhibited is in favour of those of the Lincoln.

The measurements are given for the various ages, and in contrasting the differences it is necessary that they be taken separately.

The subject of body weights, fleece weights, and the aggregate value of the wool and mutton must be left for a future issue.

(To be continued.)

The Treatment of Tick Bite in Stock.

The Secretary of the Courangra Branch of the Agricultural Bureau of New South Wales recently submitted several insects for identification. Included among these was a tick, which was stated to be very troublesome in late autumn and early spring, proving fatal to calves, dogs and pigs, and very painful to cows and horses.

The tick was identified as the *Ixodes holocyclus*, which is found along the eastern coast of the State, the exposed ticks being readily destroyed with either kerosene and soap emulsion, or cattle dip.

The following treatment, when symptoms of poisoning or paralysis set up, is recommended by the Stock Branch:—

Treatment of tick bite must be undertaken at an early stage to be of any avail. It is necessary to keep the animal's bowels moving, for which purpose a laxative should be given. Suitable laxatives are:—

For horses—Linseed oil, 1 pint.
For pigs or calves—Castor oil, 2 or 3 teaspoonsful.
For dogs—Castor oil and olive oil, 1 dessert spoonful each.

If constipation is noted, an enema of warm water and soap will be beneficial.

Otherwise, the animal must be kept comfortable in a quiet spot, and given plenty of fresh, cool water. The following should also be given three times a day:—

	Horse.	*Pig.*	*Dog.*
Aromatic Spirits of Ammonia	1 Table spoonful	1 Dessert spoonful	10 drops.
Tincture of Nux Vomica ...	1 Tea spoonful	10 drops	5 drops.

(Care must be taken with the Nux Vomica, as it is a poison.)

It is necessary, of course, that the tick should be removed at once. It is understood that adult cows are never affected.

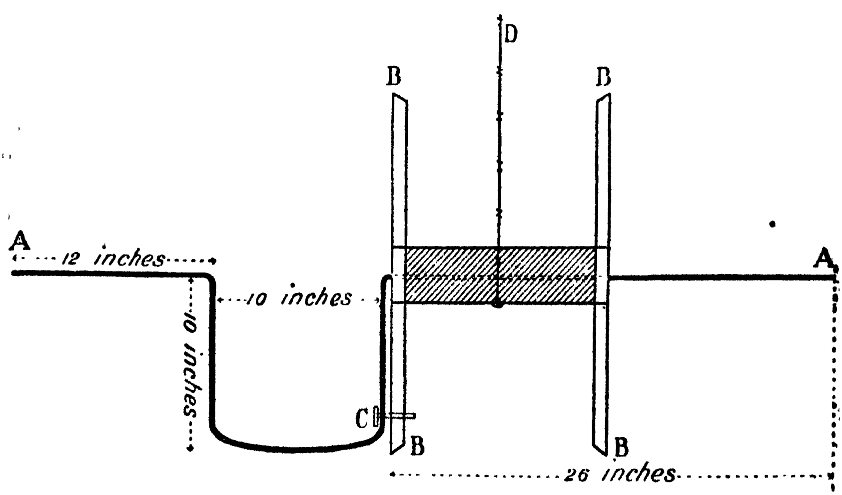
We have received an inquiry for the following copies of the *Agricultural Gazette*:—Part 12 of vol. 7, Part 3 of vol. 10, and Parts 1 and 6 of vol. 22. Should any of our readers have copies of these issues, for which they have no further use, we should be glad to hear from them.

A USEFUL BARBED-WIRE WINDER.

MR. A. B. PADDISON, of Perthville, has forwarded a sketch of a useful winder for barbed-wire. Most farmers have, at some time or other, to face the necessity of detaching barbed-wire from an old fence, and storing it for future use. Under ordinary conditions, the result is a cumbersome, loosely wound mass of wire, difficult to handle, and still more difficult to put to profitable use later.

Mr. Paddison uses a piece of ½-inch piping, about 6 feet long, and costing about 1s. This makes a first-class light windlass by heating and bending to the shape shown in the illustration. It is operated by two men, and the man operating the crank carries only about a third of the weight.

By means of such a device wire can be wound almost as tightly as the factory turns it out, and as fast as the men can walk.



A. Piece of ½-inch water-piping, 6 feet long before bending, and about 4 feet long after the crank is made.

B. Empty barbed-wire reel slipped on to pipe.

C. Strong cord fastening reel to the crank in pipe to prevent the reel turning.

D. Barbed-wire to be wound up, fastened to reel with small staple.

When the reel is filled, cut the cord, take off and slip on another empty reel.

It will be noticed that the man operating the windlass carries only one-third of the weight, having only one hand to support same, leaving the other to turn the crank.

Notes on Wheats Competing for Prizes at the Royal Agricultural Society's Show.

Easter 1914.

F. B. GUTHRIE.

The increase in the amount of prize-money for the Wheat Section has produced the effect of increasing considerably the number of individual entries, and also of improving the quality of the exhibits and the care taken in preparing the samples for competition. The task set the judges in distinguishing between so many first-class samples was a difficult one, as the difference between the competing wheats was in many cases very slight.

The amount of prize-money distributed was £120 13s., the number of entries being 91, as against 69 in 1913. Of these 91 exhibits 76 were individual samples, the remaining 15 being collections of wheat embracing five different varieties in each case.

The outstanding feature of the wheats exhibited this season was their high bushel-weights. There is only one instance of a wheat below 64 lb., and this was a very dirty sample, whilst a good number were over 68 lb. Of six varieties of Cedar exhibited in the Strong Red class, no less than three weighed over 68 lb. per bushel. Petatz Surprise is again amongst the heaviest.

This result was foreshadowed by the high figure for the f.a.q. standard this season (64½ lb.), and also from the weighing of individual samples of the 1913–14 harvest, but the generally heavy nature of this season's wheats is very remarkable, and will repay investigation as to its cause.

This season's wheats are not quite as strong nor as rich in gluten as last year's, but the improvement in these factors which has been previously noted has been well maintained.

The judging was carried out as in previous years. The bushel-weight of all the samples was taken, and the results are given in the first of the tables which follow.

After careful inspection to eliminate the inferior exhibits, those which were considered eligible for prizes were milled on the small model mill of the Department of Agriculture, and the prizes were finally awarded in accordance with their actual behaviour in the mill, marks being assigned to the different milling characteristics. The result of these tests will be found in the table headed "Results of Milling Tests," in which the figures within brackets give the actual milling results, the other figures giving the marks obtained.

The judges were Messrs. R. W. Harris, head miller, Gillespie Bros., and G. W. Norris, Chemist's Branch, Department of Agriculture; the milling of the samples being carried out by Mr. Norris.

The following table shows this increase in bushel-weight, and also the variations in bushel-weight, gluten, and flour strength in the two classes, Strong White and Soft White, since 1905.

TABLE showing average bushel-weights, gluten content, and water-absorbing power of Wheats ("Strong White" and "Soft White") milled at the Royal Agricultural Society's Shows, from 1905–1914.

Year	Weight per bushel		Gluten		Flour Strength. (Water-absorption, quarts per 200 lb sack.)	
	Strong White	Soft White.	Strong White.	Soft White.	Strong White.	Soft White.
	lb.	lb.	per cent.	per cent.		
1905	63	64	10·0	9·7	46·6	45·2
1906	63¾	64½	11·0	9·8	48·5	45·7
1907	62¼	66	9·3	8·3	48·4	45·4
1908	64½	65	12·2	10·2	52·5	46·4
1909	64¾	65¼	11·9	8·6	53·5	49·2
1910	64½	64	13·8	12·1	50·0	47·8
1911	64½	63½	12·5	11·0	53·4	47·0
1912	65	64	13·4	10·6	52·7	45·2
1913	67	65¼	15·2	11·7	53·1	46·9
1914	67¾	67	12·8	10·6	52·3	45·0

By far the most successful exhibitor was Mr. Smith Pollock, who took three first prizes and two special ones, as well as annexing, for the second time, the Champion prize for the best bag exhibited. On this account any remarks he may have to make with regard to the nature of the prize wheats are entitled to respect. The wheat with which he won the Champion prize was Cedar, which provided the champion in 1912 and 1913.

Mr. Smith Pollock, in the course of an interview, published in the *Sydney Morning Herald,* points out that the winning wheats at the Show are not the most profitable varieties for the farmer. It must not be lost sight of that the judges in this section award the prizes to the best commercial samples from the point of view of the miller and the wheat buyer. The champion wheat, in addition to being of good appearance, even in quality, and true to name, must possess in a high degree the following qualities of a good milling wheat: It must be of good bushel-weight, yielding a good percentage of flour, the flour being of high colour, good gluten content and strength. It need not necessarily be the best in any one of these particulars. For instance, it was by no means the heaviest wheat, nor was its flour colour quite as high as some of the others. It stood out above its competitors in flour-yield and in the strength and gluten of the flour.

The statement that the varieties usually successful are not good yielders is not altogether borne out by facts. There were 134 individual samples exhibited (including those entered in collections). Of these, twenty-nine samples represented crops of Comeback, which averaged 22¼ bushels per acre. The average acre-yield for the State last harvest was 11·8 bushels. The eighteen samples of Cedar exhibited averaged 21 bushels, and the eight samples of Bobs 24¼ bushels per acre.

In the macaroni class, Mr. Smith Pollock took the first prize with a sample of Medeah, giving the high yield of 33 bushels per acre, the second prize going to Mr. W. Clark, of Angle Vale, South Australia, who is a consistent prize-winner in this section with Indian Runner.

This exhibitor also obtained the second prize in the Soft White class with Petatz Surprise, weighing 68·4 lb. per bushel.

As in previous years, the Farrer wheats were conspicuous as prize-takers, all the prizes going to those wheats, except in the macaroni class, and in the case of Petatz Surprise mentioned above.

WEIGHTS PER BUSHEL.

Catalogue No.	Variety.	Bushel-weight.	Catalogue No.	Variety.	Bushel-weight.
		Class 791 (Macaroni Wheat).			
5031	Indian Runner	66·2	5034	Velvet Don	65·7
5032	Medeah	66·2	5035	,,	66·5
5033	Kubanka	66·5	5036	Huguenot	66·2
		Class 792 (Strong Flour Red)			
5037	Cedar	66·2	5041	Marquis	67·1
5038	,,	68·6	5042	Cedar	67·8
5039	,,	67·3	5043	,,	68·6
5040	,,	68·2			
		Class 793 (N.S.W. Strong White).			
5044	Comeback	66·8	5051	Comeback	68·2
5045	,,	68·1	5052	,,	68·1
5046	Bobs	68·4	5053	Bobs	67·1
5047	,,	67·9	5054	Comeback	67·6
5048	Comeback	67·4	5055	,,	67·4
5049	Bobs	67·6	5056	,,	67·0
5050	,,	68·1	5057	,,	68·4
		Special Prize (N.S.W. Strong White).			
5058	Comeback	68·1	5060	Comeback	68·4
5059	,,	67·0			
		Special Prize (Best Bag Comeback).			
5061	Comeback	66·8	5066	Comeback	67·6
5062	,,	68·1	5067	,,	67·4
5063	,,	67·9	5068	,,	67·0
5064	,,	68·2	5069	,,	68·4
5065	,,	68·1			
		Class 794 (Medium Strong).			
5070	Bunyip	66·3	5084	Federation	65·1
5071	Florence	66·6	5085	Firbank	64·7
5072	Bayah	66·0	5086	Florence	66·2
5073	,,	67·9	5087	Tarragon	67·9
5074	Rymer	66·6	5088	Florence	66·6
5075	Bunyip	67·1	5089	Bunyip	66·8
5076	Rymer	67·1	5090	Federation	66·3
5077	Federation	66·5	5091	Bayah	67·3
5078	Firbank	65·9	5092	Florence	65·9
5079	Zealand	64·9	5093	,,	65·5
5080	Bunyip	61·0	5094	,,	67·6
5081	Rymer	66·3	5095	Bayah	68·1
5082	Thew	65·4	5096	Bomen	67·0
5083	Bunyip	64·7	5097	Bunyip	67·4

WEIGHTS PER BUSHEL—*continued.*

Catalogue No.	Variety.	Bushel-weight.	Catalogue No.	Variety.	Bushel-weight.
	Class 795 (Weak Flour).				
5098	Schneider	65·9	5103	Warren	66·6
5099	Petatz Surprise	68·4	5104	,, ...	66·6
5100	Warren	65·9	5105	Gluyas Early	66·8
5101	Dart's Imperial	66·3	5107	Warren	67·6
5102	Jade	67·9			

RESULTS OF MILLING TESTS.

	Appearance of Grain.	Weight per bushel.	Ease of Milling.	Percentage of Flour.	Colour of Flour.	Percentage of dry Gluten.	Strength.	Total.
Maximum Marks.	10	15	10	10	15	20	20	100
Catalogue No.				**Class 791 (Macaroni).**				
5032	8	*[66·2]* 13	7	*[69·4]* 7½	14	*[15·8]* 19	*[46·0]* 15	83½
5031	7	*[66·2]* 13	7	*[68·6]* 7	13	*[13·4]* 18	*[45·0]* 14	79
				Class 792 (Hard Red).				
5040	9½	*[68·2]* 15	9	*[72·2]* 9	14	*[17·4]* 20	*[55·8]* 20	96½
5043	9	*[68·6]* 15	9	*[71·4]* 8½	15	*[11·9]* 18	*[55·0]* 20	94½
5042	10	*[67·8]* 15	9	*[71·1]* 8½	15	*[10·8]* 17	*[51·8]* 18	92½
5041	8	*[67·1]* 14	9	*[70·0]* 8	14½	*[13·9]* 19	*[53·4]* 18	90½
				Class 793 (N.S.W. Strong White).				
5051	10	*[68·2]* 15	9	*[71·9]* 9	12	*[14·1]* 19	*[55·0]* 20	94
5050	9½	*[68·1]* 15	9	*[71·9]* 9	12½	*[13·7]* 19	*[50·6]* 17	91
5055	9	*[67·4]* 14	9	*[71·9]* 9	11	*[12·9]* 18	*[52·0]* 18	88
5045	8	*[68·1]* 15	9	*[71·1]* 8½	7½	*[11·8]* 18	*[49·8]* 17	83
5060	7½	*[68·4]* 15	9	*[71·2]* 8½	13	*[11·5]* 17	*[54·0]* 20	90
				Class 794 (Medium Strong Flour).				
5097	10	*[67·4]* 14	10	*[74·4]* 10	15	*[10·6]* 17	*[49·6]* 16	92
5095	10	*[68·1]* 15	10	*[74·0]* 10	14½	*[11·4]* 17	*[45·0]* 14	90½
5088	7	*[66·6]* 13	10	*[70·7]* 8½	13½	*[14·1]* 19	*[51·0]* 17	88
5089	9	*[66·8]* 13	10	*[71·0]* 8½	15	*[11·2]* 17	*[46·4]* 15	87½
5092	8	*[65·9]* 13	10	*[70·0]* 8	14	*[14·3]* 19	*[47·6]* 15	87
				Class 795 (Weak Flour).				
5103	10	*[66·6]* 12	10	*[70·2]* 8	15	*[11·6]* 19	*[45·6]* 15	89
5099	8	*[68·4]* 15	10	*[70·0]* 8	15	*[10·1]* 17	*[45·6]* 15	88
5107	9	*[67·6]* 14	10	*[70·5]* 8	15	*[10·1]* 17	*[43·8]* 13	86

Awards.

Class 791— Macaroni.

First Prize, No. 5032—Smith Pollock; Medeah; grown at Glengarry, Quirindi, on black soil; seed per acre, 45 lb.; yield per acre, 33 bushels; rain during growth, 15·22 inches; autumn ploughing.

Second Prize, No. 5031—William Clark; Indian Runner; grown at Angle Vale, South Australia, on sandy soil; seed per acre, 1 bushel; yield per acre, 13 bushels; fallowed.

Class 792— Hard Red.

First Prize, No. 5040—Smith Pollock; Cedar; grown at Glengarry, Quirindi, on red soil; seed per acre, 45 lb.; yield per acre, 18 bushels; rain during growth, 12·25 inches; autumn ploughing.

Second Prize, No. 5043—William Tonkin; Cedar; grown at Delungra, on red soil; seed per acre, 45 lb.; yield per acre, 18 bushels; rain during growth, 9 inches; autumn ploughing.

Class 793— N.S.W. Strong White.

First Prize, No. 5051—Smith Pollock; Comeback; grown at Glengarry, Quirindi, on black soil; seed per acre. 45 lb.; yield per acre, 24 bushels; rain during growth, 15·22 inches: autumn ploughing.

Second Prize, No. 5050—Smith Pollock; Bobs; grown at Glengarry, Quirindi, on black soil; seed per acre, 45 lb.; yield per acre, 30 bushels; rain during growth, 15·22 inches; autumn ploughing.

Class 794— Medium Strong.

First Prize, No. 5097—William Tonkin; Bunyip; grown at Delungra; black soil; seed per acre, 45 lb.; yield per acre, 22 bushels; rain during growth, 9 inches; autumn ploughing.

Second Prize, No. 5095—William Tonkin; Bayah; grown at Delungra; black soil; seed per acre, 45 lb.; yield per acre, 20 bushels; rain during growth, 9 inches; autumn ploughing.

Class 795— Weak Flour.

First Prize, No. 5103—J. B. Roach; Warren; grown at Gilgandra on sandy loam; seed per acre, 45 lb.; yield per acre, 24 bushels; rain during growth, 5 inches; autumn ploughing.

Second Prize, No. 5099—William Clark; Petatz Surprise; grown at Angle Vale, South Australia, on sandy soil; seed per acre, 1 bushel; yield per acre, 12 bushels; fallow.

Special Prize for Best Bag of N.S.W. Strong White from an area of not less than 100 acres, grown in districts having a mean annual rainfall of 20 inches or less.

First Prize, No. 5060—William Tonkin; Comeback; grown at Delungra on black soil; seed per acre, 45 lb.; yield per acre, 24 bushels: rain during growth, 10¼ inches; autumn ploughing.

Second Prize, No. 5058—Harry Rice; Comeback; grown at Lifton Park, Canowindra; seed per acre, 40 lb.; yield per acre, 16 bushels; rain during growth. 8 inches; fallow.

Special Prize for best bag of Comeback.

Smith Pollock, Quirindi, No. 5051, Class 793.

Champion Prize for the best bag of Wheat exhibited.

Smith Pollock, Quirindi, Cedar; No. 5040, Class 792.

SPECIAL PRIZES FOR THE BEST COLLECTION OF FIVE FARRER WHEATS.

First Prize—Smith Pollock, Quirindi, No. 5112.

Variety.	Seed per acre.	Yield.	Rainfall.	Soil.
	lb.	bus.		
Bobs	45	30	12·25 in. during growth.	Black.
Comeback	,,	24		,,
Jonathan	,,	20		Red.
Cedar	,,	18		,,
Bunyip	,,	28		Sandy loam.

Average weight per bushel, 67·2 lb.

Second Prize—J. B. Roach, Gilgandra, No. 5114.

	lb.	bus.		
Cedar	45	12	5 inches during growth.	Sandy loam.
Comeback	,,	24		,,
Bobs	,,	27		,,
Jade	,,	21		,,
Schneider	,,	24		,,

Average weight per bushel, 66·8 lb.

The varieties included in the other collections in this section were :—

No. 5109.—Rymer, Federation, Cedar, Bayah, Comeback. Average weight per bushel, 67·18 lb.

No. 5110.—Bobs, Comeback, Rymer, Cleveland, Thew. Average weight per bushel, 66 04 lb.

No. 5111.—Thew, Firbank, Federation, Bunyip, Comeback. Average weight per bushel, 66·48 lb.

No. 5113.—Comeback, Jade, Firbank, Rymer, Federation. Average weight per bushel, 66·8 lb.

No. 5115.—Cedar, Comeback, Warren, Plover, Jade. Average weight per bushel, 66·8 lb.

No. 5116.—Cedar, Comeback, Bayah, Bunyip, Bomen. Average weight per bushel, 66·7 lb.

SPECIAL PRIZE FOR BEST COLLECTION OF FIVE NON-FARRER WHEATS.

J. B. Roach, Gilgandra, No. 5119.

Varieties.	Seed per acre.	Yield per acre.	Rainfall.	Soil.
	lb.	bushels.		
Marshall's No 3	45	21	5 inches during growth.	Sandy Loam.
Purple Straw	,,	22		,,
Petatz Surprise	,,	18		,,
Marquis	,,	21		,,
Zealand	,,	27		,,

Average weight per bushel, 67 lb.

The varieties included in the other collections in this section were :—

No. 5120.—Marshall's No. 3, Purple Straw, Petatz Surprise, Dart's Imperial, Zealand. Average weight per bushel, 66·4 lb.

No. 5121.—Marshall's No. 3, Carmichael's Eclipse, Gluyas Early, Talavera, White Lammas. Average weight per bushel, 66·5 lb.

The Indian Jute Industry.

WITH a view to obtaining an authentic report on the jute industry of India, and thus ascertaining the possibilities of placing the importation of wheat bags, wool bales, &c., into New South Wales on a more satisfactory footing, the Minister of Agriculture, the Hon. W. G. Ashford, M.L.A., instructed Mr. J. B. Suttor, the Commercial Commissioner for New South Wales in the East, to visit Calcutta and the jute-producing districts, and investigate the question on the spot.

Mr. Suttor had been in India previously, a fact which greatly facilitated his inquiry.

It will be seen from Mr. Suttor's interesting summary of the conditions under which jute is produced in India, that the conclusions contained in the article on "Jute" in the *Agricultural Gazette* for August, 1913, are well justified. The report states:—

A Virtual Monopoly.

India has a monopoly in regard to the production of jute, and, consequently, all grain and wool producing countries have to look to India to meet their requirements, the result being that the market fluctuates to a very great extent, and leads to wild speculations in any country where a bumper harvest is expected, and with corresponding gains should expectations be realised, or losses when the contrary is the case. Jute being in such active and universal demand, it is quoted on all markets of the world, and all business transacted is done by cable and subject to reply within stipulated time, which hardly ever exceeds a day or two.

Another disturbing element is to be found in the fact that should a crop failure be forecasted from India reaction at once takes place on all other markets.

Market Fluctuations.

The following will convey an idea of the rise and fall of the local market for each fortnight from 31st January, 1913, to 24th April, 1914:—

The quotations being for standard 41 inch x 23 inch Australian sacks per 100, and in reducing the local prices to sterling I have taken the rupee at 1s. 4d. Sacks quoted are of No. 1 quality, and f.o b. Calcutta.

Date 1913.	£	s.	d.	Date. 1913.	£	s.	d.
31 January ...	2	6	0	6 June ...	2	6	8
14 February ...	2	5	4	20 " ...	2	6	8
28 " ...	2	5	4	4 July ...	2	7	0
14 March ...	2	5	4	18 " ...	2	8	4
28 " ...	2	6	8	1 August ...	2	9	0
11 April ...	2	6	8	14 " ...	2	10	0
25 " ...	2	6	0	29 " ...	2	10	0
9 May ...	2	7	4	12 September ...	2	11	8
23 " ...	2	6	8	26 September ...	2	17	4

Market Fluctuations—*continued.*

Date. 1913.		Price. £ s. d.	Date. 1914.		Price. £ s. d.
10 October	...	2 17 8	16 January	...	2 10 8
24 „	...	2 16 8	29 „	...	2 9 4
6 November	...	2 13 4	13 February	...	2 9 4
21 „	...	2 12 8	27 „	...	2 10 0
5 December	...	2 11 4	13 March	...	2 8 8
19 „	...	2 11 0	27 „	...	2 8 8
1914.			8 April	...	2 9 4
2 January	...	2 11 4	24 „	...	2 9 4

The Jute Industry generally.

While the foregoing remarks will convey a general idea of business methods, I will now endeavour to place clearly before you a brief survey of jute, from the sowing, harvesting, buying, and grading to the completed fabric.

World's Demands for Raw Jute.

The world's annual demand is estimated by the Commercial Intelligence Department of India at about 1,700,000 tons of raw jute; 791,000 tons is the estimated mill consumption, thus leaving an exportable surplus of 909,000 tons.

England takes over ...	... 340,000	tons.
Germany „ ...	... 180,000	„
U. S. America „ ...	... 124,000	„
France „ ...	... 86,000	„
Other countries take over	... 179,000	„
Total ...	... 909,000	tons.

Jute Manufactures.

The jute manufactures represent 40 per cent. of the total value of exports of Indian manufactures, and the raw jute over 26 per cent. of Indian raw materials exported. The above percentages will convey an idea of the enormous extent of the trade in this commodity.

Jute Fabrics Exported.

The following will convey an idea of the demand that exists, the figures quoted being for exports during the financial year 1912–13. The details for 1913–14 are not yet available, beyond the fact that the 1913–14 harvest shows a falling off of about 200,000 tons compared with the previous year, this falling off being due to an unfavourable season, and as a result of the falling off we are to-day experiencing an excited market:—

1912–13 Exports.

Country.		Amount. £		Principal form of Export.
U. S. America ...	...	5,840,333	...	Cloth.
Argentine ...	...	1,944,687	...	„
Australia ...	...	1,433,733	...	Bags and bales.
England ...	...	960,933	...	„ cloth.

1912–13 Exports—*continued.*

Country.	Amount. £	Principal form of Export.
Chile	564,067 ...	Bags.
China	530,200 ...	"
Canada	490,467 ...	Cloth.
Java	426,600 ...	"
Egypt	373,933 ...	Bags.
West Indian Islands ...	337,800 ...	"
Straits Settlements ...	198,200 ...	"
Natal	173,933 ...	"
French Indo-China ...	157,200 ...	"
Cape Colony	152,666 ...	"
Germany	144,533 ...	"
Siam	134,067 ...	"
Turkey in Asia ...	114,333 ...	"
Uruguay	87,600 ...	Cloth.
Peru	81,600 ...	Bags.
Japan	45,467 ...	"
Turkey in Europe ...	37,933 ...	"

Acreage under Crop.

Bengal is the leading jute-producing centre of India. It is estimated that about 3,400,000 acres are under cultivation, and that an average crop gives about 1,000 lb. of jute fibre to the acre, the quality of which is largely governed by soil and climatic conditions. The most satisfactory results are obtainable from rich loamy clays mixed with sand, or any soil suitable for tobacco-growing, provided the dense humidity of the atmosphere and rainfall are the same as in Northern Bengal. It is the absence of the latter and other necessary elements that has made the successful cultivation of jute a failure in other countries.

Sowing and Harvesting.

Having visited the principal producing areas, according to directions, I am enabled to place the following facts before you, all of which are necessary in order to enable an opinion to be formed as to the controlling influences to be contended with in the growth and production of jute, as also the conditions governing the whole industry, from the sowing and harvesting down to the consumer of the manufactured article, whether such be wheat sacks, wool bales, cloths, or hessians.

Jute Farms.

The jute farms, or holdings, are generally of small areas of from 1 and 2 acres up to much larger areas, and are solely worked by the natives, who alone can stand the great severity of the climate. The soil is frequently ploughed several times to thoroughly pulverise it before sowing. There

would appear to be no particular attention paid to any superior fibre-yielding seeds. The sowing, according to the locality and nature of the soil, takes place in February, March, and April, broadcast sowing being more generally adopted and about 8 lb. of seed to the acre being used. While moisture is absolutely necessary, it does not follow that jute areas are irrigated, except in cases where there is a falling off in rainfall or a great absence of humidity.

When the crop is about to flower it is considered ripe for harvesting; at this time, according to climatic conditions, the jute stalks are generally 4 to 12 feet high and even higher in some localities.

The harvesting takes place in June, July, and August, and in some cases up to September. It is done by hand labour with an ordinary small sickle or cutting knife, and the plants cut as close to the ground as possible, while in some cases the stalks are pulled up by the roots. At harvest time the jute is frequently growing in water produced by flood or monsoonal rains, with the result that a portion of the plant has to be cut under water. This will be referred to later on under the heading of "Cuttings and Rejections."

Having cut the crop, the next and most important process is the system of "retting" or separation of fibres. As fast as the jute stems are cut they are collected in bundles and then made into larger ones more resembling a jute raft, and then submerged from ten to fifteen days in water by means of earth or other weight. Sweet and not stagnant or running water is necessary for the germs which hasten the decomposition of the tissues holding the fibres together. When the decomposition, as a result of the submerging, is considered complete and the fibres easy of separation, the cultivator proceeds to separate and clean the fibres under conditions no European could possibly endure. Standing up to his waist in the now fœtid water, he takes hold of a handful of stems and beats the thick ends with a mallet to expedite the separation. He then strips each stem one after the other from end to end, and thus removes the core which has, so far, no commercial value

Then taking up a larger bundle of the ribbons, or stripped fibres, he then lashes them on the surface of the water and draws them rapidly towards himself by a sharp jerking motion, or erects a small bamboo rail placed horizontally just above water-level, and over which he rapidly draws the fibres to remove any foreign matter, and, lastly, he spreads the fibres out on the surface of the water to remove by hand any adhering particles.

The fibre is then finally wrung out and thrown over a bamboo rail previously fixed as a drying rack. This drying process usually takes two or three days, and during this time the fibre is also bleached in the sun.

The jute fibres are then collected from the drying rack and placed in small bundles to await a purchaser, the following being the system most in vogue. This has really insinuated itself into the life of the country, and a brief description will convince you further of the difficulties to be contended with

Raw Jute from the Farmer to the Baling Works.

The new season's jute generally appears on the market in the latter end of June or beginning of July, and continues up to the next harvesting, say, June of the following year.

It would appear to be an absolute impossibility for the jute mills to deal direct with the producers. There are usually two and three handlings between the grower and the mill or manufacturer, viz., the native money lender, known as Aradar, who generally advances money to the farmer at extortionate rates; the native "Bepary" who buys from the farmer and who generally works with due regard to the interests of the Aradar or money lender; and the baler, a European who acts on behalf of the jute mills or the company engaged in baling the raw jute.

When the season commences, the Bepary, who usually controls a large flotilla of small craft of about 50 tons capacity, starts off with his craft on a visit to the farmers on the water front, and by rail, or other means, to the farmers situated inland.

The system of buying from the farmer is at all times a tedious and pains-taking operation, and I feel confident that no one but a Bepary could quibble and talk for hours over such small purchases. Time counts for nothing with the Indian farmers and Beparies, and although a farmer may have from 10 to 100 tons of jute fibre, after sitting on their haunches for hours discussing matters, the interview may end in the purchase of any small quantity from 10 lb. upwards, and thus the buying operations proceed from farm to farm, the farmer always holding stock in hand with a view to higher prices later on.

When the Bepary manages to purchase sufficient to fill one or more of his craft, he then proceeds to visit one or all of the nearest baling companies, and finally sells to the one offering the highest rate. The baling company, after buying the raw jute from the Bepary in hanks or small bundles, and after proving the weight and quality, a very necessary operation, for the trade is a very tricky one, then proceeds to grade and put the jute up in bales of 330 lb. for the local mills and 400 lb. for export. The balers, being experts in quality, classify the raw jute as follows:—

No. 1 quality, suitable for 80 to 90 per cent. hessian warp and 10 to 20 per cent. of weft.

No. 2 quality, suitable for 60 to 70 per cent. hessian warp and 30 to 40 per cent. of weft.

No. 3 quality, suitable for 70 per cent. of sacking warp and 30 per cent. of weft.

No. 4 quality, suitable for 40 per cent. of sacking warp and 60 per cent. of weft.

In the jute trade warp and weft are known as porters and shots, and the above qualities are commercially referred to as ones, twos, threes, or fours.

For foreign markets the standard quality of the 400 lb. bales is usually quoted as of M group or "cracks," and means an equal proportion of twos and

threes qualities as per above. The M group really forms the basis of all telegraphic advices regarding the market for raw jute.

From Jute Bale to the Mill.

The bales done up for local mills pass through practically the same process as the weaving of woollen goods, with the exception of first of all passing through a softening machine with fluted rollers, where a small percentage of oil and water is added, to soften the fibres for the carding and yarn spinning machines. Thence it proceeds to the looms, and when the fabric is completed, it is passed through a machine known as a callender, with rollers heated up to 600 degrees Fah., giving a smooth surface, and evaporating any moisture that hitherto existed as a result of the softening process previously described. But in the case of cloth for wool bales, there is another machine the fabric passes through known as a cropper, the object being to remove any loose fibres from the surface of the cloth. This cropping process is only d ne when buyers agree to pay the extra cost necessary to pass the cloth through the cropping machine, resulting in many complaints in Australia through pastoralists buying at a cheaper rate wool bales which had not been passed through the cropping machine; hence complaints of jute fibre getting mixed with their wool.

Cuttings and Rejections.

Cuttings.—When the jute is harvested, the fields may be covered in water at from 6 inches to 3 feet, according to floods or monsoonal conditions. That portion of the jute stalks, or ends, cut under water is usually more discoloured and hardened after bleaching than is the case with that portion of the fibre coming to maturity above water, and such hardened and coloured ends are cut off at the mills after the jute passes through the fluted softening machine, and are, later on, repassed through the machine. They are then made into yarn of inferior quality for wefting (shots), or mixed with other yarn for fabrics of inferior strength or quality.

Rejections.—These are usually fibres of inferior quality as a result of careless bleaching and other causes. It is also a well-known fact that some of the farmers or designing buyers (Beparies) have been known to add water to increase the weight of the jute at the time of sale. Jute once remoistened rapidly deteriorates and becomes rotten. Sand, or loam, has also been known to be added.

Fibres recovered from the roots after cutting, or at time of harvesting, if pulled up bodily, also come under the heading of "rejections," and while no mill of any standing would attempt to work in such cuttings and rejections into high grade yarns, it is quite possible, and I even have strong suspicions, that such inferior fibres are utilised by people who are not over-scrupulous by way of meeting demands, and hence a very inferior fabric, or sack, may find its way to Australia.

Northern and North-Western Wheats.

A Comparison with those from the South and West.

F. B. GUTHRIE.

For many years the northern wheats have enjoyed an unenviable reputation among millers and wheat-buyers, on account of their alleged softness, their containing too much moisture, and their proneness to develop weevil. These characteristics, especially the last, are particularly objectionable from the point of view of the exporter, though it does not seem to affect their value to the same extent when used as wheats for local milling.

On this account many Sydney wheat-buyers and shippers are averse to purchasing northern wheat, and some have gone so far as to object, in previous years, to its inclusion in the f.a.q. sample.

Protests have been received from northern millers and farmers, who point out that, during the last few year at all events, a harder type of wheat has been cultivated in the northern districts, and that in bushel-weight, gluten content, and flour strength they are now in no way inferior to southern and western grain. It is also pointed out that the tendency is for wheat-growing to extend into the warmer and drier districts in the north-west of the State, and a harder grain and one richer in gluten is the result. Further than this, a considerable trade is developing with the East, where the demand is not for such a strong flour as is required for the London and Continental markets, and where a good demand exists for flours of high colour combined with fair strength and gluten-content, which can be supplied by the northern wheats. The fact is also pointed out that it is not until the wheat is stored on the coast that it develops weevil.

In order to test the matter, samples of wheat from last harvest from Narrabri and Curlewis were collected by the Agricultural Inspector for the district, and forwarded for examination. Samples of the same varieties grown at Canowindra and Gilgandra, which had been milled and examined for the Royal Agricultural Society's Show last Easter, were compared with them, and the results are given in the following table. The milling of all the samples was carried out by Mr. G. W. Norris.

The table on the following page compares the results of samples of Comeback and Florence wheat grown at Narrabri with the same wheats grown at Gilgandra, and of Federation grown at Curlewis with Federation grown at Canowindra. In the matter of bushel weights the western samples are somewhat higher than the corresponding north-western samples, and the percentage of flour obtained is on the average about the same.

Comparison of Wheats Grown in different Districts.

Variety of Grain.	Florence.		Comeback.		Federation.		Bunyip.
Grown at.	Gilgandra.	Narrabri.	Gilgandra.	Narrabri.	Canowindra.	Curlewis.	Narrabri.
Appearance of grain ..	Yellow, translucent, plump, shallow crease, medium size, fairly hard, angular.	Dark yellow, hard, very plump, fairly large, shallow crease, rounded sides.	Translucent, plump, hard, shallow crease.	Small, plump, fairly translucent, shallow crease, mixed.	Yellowish white, soft, plump, small.	Yellowish white, soft, plump, medium size.	Yellowish, plump, soft, medium size, shallow crease.
Weight (lb. per bushel)	65·9	65·1	67·4	66·2	66·8	65·2	65·4
Ease of milling..	Fair	Fair	Fair	Fairly easy	Easy	Easy	Easy.
Percentage of mill products. Flour	70·0	69·3	71·9	73·2	71·0	69·2	70·0
Percentage of mill products. Pollard	13·4	16·3	12·6	13·7	14·0	14·8	15·8
Percentage of mill products. Bran	16·6	13·9	15·5	13·1	15·0	16·0	14·2
Nature of flour. Colour of flour	Excellent	Fair, rather dark, texture horny.	Good	Excellent	Excellent	Very good, whitish	Excellent; good surface and texture.
Nature of flour. Strength of flour (in quarts, per sack of 200 lb.).	47·6	48·6	52	48	46·4	44·0	44·4
Nature of flour. Percentage of dry gluten.	14·3	18·3	12·89	13·1	11·2	9·4	13·9
Nature of flour. Character of wet gluten.	Faint yellow, coherent, elastic, soft.	Dark yellow, very coherent, adhesive, slightly elastic.	Yellow, elastic, tough, non-coherent.	Faint yellow, elastic, tough, non-coherent.	Yellow, elastic, coherent, soft.	Yellowish, coherent, soft, slightly elastic.	Slight yellow, elastic, fairly coherent.
Notes	Bran and pollard both fairly clean; semolina yellow and gritty. Yield, 30 bushels. Rain, 9 inches during growth.	Bran clean, small; pollard fairly clean; semolina yellow and gritty. In determining the strength, this variety always produces a sticky dough, which is very marked with this sample.	Bran fairly clean, pollard clean, semolina yellowish and gritty. Yield, 30 bushels. Rain, 9 inches during growth.	Bran clean, medium size; pollard clean; semolina light yellow and slightly gritty. This sample is not true to type, as it contains a number of foreign grains.	Bran clean, small; pollard clean; semolina yellow and soft. Yield, 16 bushels. Rain, 8 inches during growth.	Bran clean, medium size, fairly thick; pollard fairly clean; semolina white and soft. The wet gluten in this sample was not so elastic or as yellow as is usual with this variety.	Bran clean, medium size; pollard fairly clean; semolina slight yellow and soft.

In respect of colour, gluten, and flour-strength it would appear that the nature of the variety has more to do with the matter than has the district. That is to say, the northern-grown Florence is richer in gluten and more water-absorptive than the same variety grown in the west, but is not of such good colour. On the other hand, the Narrabri-grown Comeback yields a weaker flour but of better colour than that grown at Gilgandra, with almost the same gluten-content. In the case of Federation the Canowindra sample is superior in colour, strength, and gluten-content to that from Curlewis.

These results, while they show that there is no definite superiority in milling excellence in wheats from the districts chosen, are open to certain objections when they are used as a basis of comparison. In the first place, the samples from Gilgandra and Canowindra were entered for competition in their classes at the Royal Agricultural Society's Show, and are consequently picked and probably graded samples, whereas the north-western samples were taken from the farmers as they came from the thresher. In the second place, the peculiarities of the individual wheats and their adaptibility to the different climates may influence their milling quality.

It was, therefore, considered that a fairer test could be made by milling bulk samples of wheats from the different districts.

Through the courtesy of Messrs. Gillespie Bros. samples were obtained of their bulk of northern, southern, and western wheats, cleaned and graded, and ready for blending.

These bulk samples are made up of wheats from a number of different districts and form representative samples of the grain obtained from the north, south, and west respectively.

The results of the separate milling of these samples by Mr. G. W. Norris is given in the subjoined table.

From this table it will be seen that the northern mixture is is no respect inferior to the others. There is, as a matter of fact, very little to choose between them. The northern is a heavy wheat, being equal to the southern, and heavier than the western. It stands midway between the two in flour yield. In colour of flour there is little to choose between it and western wheat, the southern wheat being somewhat whiter. The same remarks apply to strength and gluten-content. In both these points the northern and western are almost identical and slightly superior to the southern.

Whatever has been the case in past years, it would appear that there is now very little to choose, as far as milling quality goes, between the northern and north-western wheats and those from the south and west.

This may be due to the fact that stronger and hardier varieties are being grown, or to the fact that the westward extension of the wheat-growing area is productive of increased strength and gluten-content, on account of the drier and warmer conditions during the ripening period.

The question of the liability of the northern wheat to contract weevil, a property which affects its keeping quality and its value as an article for

COMPARISON OF MILLERS' MIXTURES.

Variety of Grain.		1 Northern Mixture.	2 Southern Mixture.	3 Western Mixture.
Appearance of Grain		Light amber, medium size, plump, soft.	Light amber, medium size, plump, soft.	Light amber, medium size, plump, soft.
Weight (lb. per bushel)		65·9	65.9	64·2
Ease of milling		Easy to mill	Easy to mill	Easy to mill.
Percentage of mill products.	Flour	71·2	72·5	69·8
	Pollard	14·5	14·4	17·1
	Bran	14·3	13·1	13·1
Nature of Flour.	Colour of Flour	Excellent	Excellent, shade lighter than Western Mixture.	Excellent.
	Strength of flour (in quarts per sack of 200 lb.	46·0	45·6	46·0
	Percentage of dry gluten	14·4	12·0	14·3
	Character of wet gluten	Yellow, elastic, coherent, soft	Yellow, elastic, coherent, soft	Yellow, elastic, coherent, soft.
Notes		Both bran and pollard clean; semolina faint yellow and soft.	Both bran and pollard clean; semolina faint yellow and soft.	Bran clean, medium size; pollard fairly clean; semolina faint yellow and soft.

export, is a separate one. It seems to be the universal opinion that the northern wheat is more liable to become weevily. The reason for this probably does not lie with the wheat itself, but with the conditions under which it is harvested. All new wheats when bagged have a tendency to heat, and this tendency would be much greater in wheats bagged in the northern wheat-fields, where comparatively humid conditions prevail, than in the drier atmosphere of the south and west.

This heating furnishes a more favourable temperature for the earlier hatching out of the eggs.

When stored for any length of time without precautions against the hatching out of weevil, all wheats will develop them in the course of time. This refers to the hardest macaroni wheats equally with the soft wheats. The fact seems to be that the weevily condition becomes sooner apparent in the northern wheats because these are bagged under surroundings favourable to a rapid development. This is a serious objection to the miller, since he prefers a wheat with keeping qualities in order to keep a stock for blending purposes, so that he can ensure a uniform flour all the year round.

To sum up, it would appear that the northern and north western wheats are in all respects quite as good milling wheats as the southern and western wheats, but that the more humid conditions under which they are bagged render them liable to develop weevil more readily than those bagged in the drier districts, and consequently affect their keeping qualities.

Similar objection is raised to Northern River maize, because of its tendency to develop weevil. As much as 2d. or 3d. more per bushel has been paid for Tumut-grown maize than for the Northern River product on this account. The cause is the same as in the case of wheat.

Analyses of New South Wales Wines.

[Continued from page 344.]

F. B. GUTHRIE AND L. A. MUSSO.

Series X.

The wines, the analyses of which appear in the attached table, come from a vineyard in the county of Cumberland, and are all young wines of this year's vintage. The white wine Riesling is still fermenting slowly. The other wines appear in good condition, the red ones having completely lost their sugar. The volatile acidity is in all cases low, in some wines (in Hermitage, Verdot and Cabernet, and in White Sweet) very low. The amount of ash is distinctly high, and this enhances the value of these wines. It will be noticed that all the red wines contain a good proportion of tannin, as much as 0·187 per cent. This is also a good feature, as tannin increases the keeping qualities of wine.

TABLE X.—ANALYSES OF NEW SOUTH WALES WINES.—SERIES X.

Name of Wine.	Specific Gravity at 15·5° C	Absolute Alcohol by volume per cent.	Percentage of Proof Spirit.	Total Acids as Tartaric.	Fixed Acids as Tartaric.	Volatile Acids as Acetic.	Extract.	Ash.	Sugar.	Tannin.	Total Tartaric Acid.	Potash as Bitartrate.	Tartaric Acid free.
Riesling	0·9913	15·68	27·48	0·61	0·48	0·10	2·84	0 242	0 81	0·001	0·361	0·277	0·06
Hermitage	0·9947	13·99	24·52	0·58	0·46	0·096	3·10	0·355	Nil.	0·169	0·328	0·403	0·006
Hermitage, Verdot, and Cabernet ..	0·9958	12·05	21·11	0·60	0·54	0·05	2 99	0·320	Nil.	0·142	0·427	0·381	0·123
Verdot...	0·9953	12·77	22·38	0·60	0·52	0·064	2·87	0·328	Nil.	0·140	0·340	0·351	0·056
Hermitage and Verdot	0·9953	13·71	24 03	0·58	0·48	0 08	3·20	0·338	Nil.	0·187	0·358	0·324	0·080
White Sweet	1·0216	16·70	29·27	0 48	0 41	0·06	10·9	0·215	9·45	0 006	0·304	0·256	0·100

Broom-making on the Farm.

G. MARKS, Inspector of Agriculture, North Coast District.

FOR a long time it was generally thought that the making up of millet into brooms was an industry that required special skill, large buildings equipped with up-to-date and expensive machinery, and a fair amount of capital. Farmers who grew millet were quite content to dispose of their crop as soon as it was harvested and baled. Should they strike an early or late market when prices were high, they found that broom millet was a profitable crop to grow, but should it be their luck to market their crop in midseason, when the main crops are always sold, the prices in innumerable instances were usually low, and the grower became somewhat dissatisfied with his returns. On this account the area of millet under cultivation in this State is constantly fluctuating, but those who watch the markets, and the probable supply and demand, are able to adjust their sowings, hold on to their supplies, or sell, and so get the full benefits of good markets. On the other hand, those who rush indiscriminately into the business without much experience, who plant big areas, and do not make the necessary arrangements for suitable labour at harvest time, and who market the whole of their crop as soon as it can be got ready, regardless of whether the market is glutted or prices low, invariably become disappointed with the returns, which naturally leave them with little profit after all expenses are paid. There is not the same necessity, as with, say, maize and potatoes, to dispose of broom millet immediately it is matured, and provided the brush is carefully harvested, cleaned, cured, and baled, it takes up comparatively little room, and will keep indefinitely without deterioration. Of late years, however, the demand for good broom millet has been keen, and prices throughout the season have been well sustained.

But there is another branch associated with the growing of this crop that might well be considered by farmers, and that is the making up of their own millet into the commercial article, and selling their crop, not in the form of bales of millet, but as bundles of manufactured brooms, ready for domestic use. In this respect the farmer, besides being a grower, becomes also a manufacturer, and he reaps the benefit of securing all the profits that are to be obtained from millet. He also saves freight, selling and other charges in the ordinary form of marketing the raw product. In every district there is ample room for a few manufacturers to get to work to supply local requirements, without considering the question of forwarding to distant markets. On most farms, particularly of the mixed type, there are many occasions, notably during wet weather, when outside farm operations have to be suspended, or in between sowing

or harvesting, when ordinary farm work is somewhat slack, when the time could be very profitably employed in some such industry as the manufacture of millet brooms. With proper systematic working, the planting, harvesting, curing of millet, and manufacture of brooms can be so arranged as not to interfere with the ordinary farm crops, or general work, at any rate, to any great extent. To do this, the farmer plants his millet in small areas, at intervals of a few weeks between each sowing. This enables him to harvest the whole of each planting at its best, and to get it out of the way before the next planting is ready. Were the whole area planted at once, a considerable quantity would be too ripe before it could be dealt with, unless plenty of suitable labour was readily available. It is, however, best for the farmer to rely upon what he or his sons can handle comfortably, as few things are more annoying than to see a crop spoiling in the field after reaching maturity, in consequence of not being able to obtain outside labour. Labour required for but a few weeks is not readily obtainable in farming districts, and it is only natural that those looking for employment should desire something more permanent.

The manufacture of his own millet into brooms also enables the farmer to understand better what is actually required for broom-making, and this knowledge assists him materially in his field operations in the production of the right class and quality of the different grades. Anything that he cannot work up into brooms is valueless. The best quality brooms naturally are the most profitable to make, and there is the incentive to grow the best grades of millet to produce these. Like every other business, broom-making cannot be learnt without a little practice under the vigilant eye of an experienced man, but any intelligent individual who is capable of being taught would very quickly learn the art. The work is not laborious, and with the production of honest, serviceable articles, no difficulty would be experienced in having them readily disposed of. The best arrangements would be to enter into an agreement with some local storekeeper, or storekeepers, to supply a certain quantity at stated prices, and to have these made up and delivered at regular intervals throughout the year. By this method, the storekeeper would know exactly whether he could obtain the whole or only portion of his requirements locally, and the farmer would know just what time he would be required to devote each week or month to broom-making. This system has worked well in districts that have come under notice, and in several of these the farmers have had requests for just double the quantity they could supply.

The general cultivation and marketing of broom millet have already been dealt with in a former article, but in dealing with the manufacture of brooms it will be necessary to refer again to some of the remarks already published. The farmer who contemplates entering the business of manufacture would probably not plant quite as large an area to commence with, as he would if marketing the raw material, particularly if he were carrying on at the same time a number of other operations, such

Fig. 1. -Crop of Italian Broom Millet.

Fig. 2.—Drying Short Millet on portable wooden frames.

BROOM-MAKING ON THE FARM.

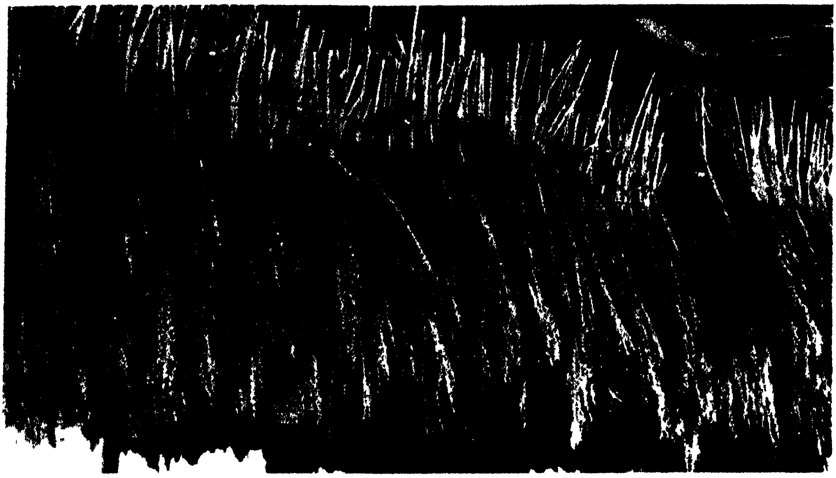


Fig. 3.—Drying Millet on wires suspended in an open barn.

Fig. 4.—Turning handles in a lathe.

BROOM-MAKING ON THE FARM.

as are usual on a mixed farm. On the other hand, if preference were given to broom-millet, it would be wise also not to venture with more than a few acres at the start, for no matter what advice may be given, there are many phases of the work that can only be learnt by practical experience. In the dry districts west of the Great Dividing Range, the grower would not be faced with the same difficulties as beset the coastal farmer, where the continued showery weather and humid conditions which usually prevail at harvest time render the proper drying and curing of the brush a rather tedious and difficult operation.

Since the object of the farmer would naturally be to manufacture the best grades, the question of drying and curing needs special consideration. There is not the slightest doubt but that the finest and brightest colour in the brush can be best obtained by drying under cover, in a dry, well-ventilated barn, or shed, but away from the direct rays of the sun. Such sheds are of the greatest importance in humid coastal districts, as without their use it is practically impossible to dry all of one's millet without some deterioration in colour and quality. Even if there be no actual rains, there are usually heavy dews in the morning, when handling late crops, that are just as detrimental as showers, and retard drying operations. On the other hand, it is not wise to try to dry millet too quickly by leaving it exposed in the field in thin layers to a scorching summer's sun. A certain amount of time must necessarily elapse in order to allow the sap contained in the stems and thick panicles to be dried out, without rendering the brush brittle. The length of time required varies considerably with the elevation and climate, but it is essential that in this operation the toughness of the brush is not destroyed. If dry conditions prevail at harvest time the brush may be partly dried in the field by leaving it exposed for several hours, and then conveyed to a roomy shed, where the drying is completed by suspending the brush on wires tightly drawn between posts, and spaced so as to allow of free air movement between each line. The simplest way to do this is to push the stem end of one brush through the panicles of another near its base, and place it over the wire on the angle thus formed. This system keeps the heads well spread and facilitates drying.

It may be necessary to provide openings in the shed in order to allow free currents of air to pass. It must be distinctly understood that closed sheds are undesirable. The moisture, as it evaporates, cannot escape quickly enough, and the moist atmosphere thus created does not favour proper drying. Under such conditions moulds of various kinds are likely to appear, which lead to discoloration and tend to spoil the brush. The lines of brush should be kept near the roof, and if the roof be constructed of iron, the heat reflected will assist materially in drying quickly that portion (viz., the stems) that takes the longest time.

With short millet the most convenient way to deal with it is to place it in thin layers on portable wooden frames, which can be placed wherever required. As the seed is of some value for poultry and pig feeding, it is

advisable to have it dried also, in which case it is dried with the brush. This, however, takes the millet longer to dry. If the seed is removed immediately the brush is harvested, in which state it is still sappy, the brush may be dried much more quickly, and there may be occasions when it may be desirable to carry out the work in this manner. The seed can then be treated separately. When the millet is placed on the wire at first, a little space should be left between each, and as drying proceeds the brush can be forced along the wires, thereby taking up less room. In a similar way the thin layers on the frames can be gradually increased in thickness as drying proceeds.

Whatever system is adopted, care should be taken to see that it is thoroughly dry before placing it together in bulk. When dry, the seed is removed. The brush can then be graded, and baled if not required to be used at once. If intended to be worked up at an early date it may be packed into crates or boxes, and kept away from bright light. It must be distinctly understood that millet, when just dried and baled, is not in a fit condition to manufacture into brooms. In the ordinary course of drying there will be different stages of ripeness when the millet is cut. There will also be slight differences in the degree of dryness when bulked. The fine and well-matured brush will attain a greater degree of dryness than the coarser and greener brush. If worked up at this stage, the brush would be very brittle, and cut and break with the pressure of the wiring machine. When, however, the dried brush is bulked, either in bales or in the other forms described, a certain amount of sweating takes place. This has a beneficial effect upon the brush. That which has been over-dried will take up a little of the dampness of that which is not quite so dry, while that which might not have been dried quite enough will give off some of the excess moisture to the very dry and brittle material by its side. The result of this slight sweating is that the whole of the brush is made tougher and more pliant. It will be more uniform in its degree of dryness, and can be safely handled and made up without danger of cutting or breaking.

Under favourable conditions, millet should not be worked until after it has been bulked for at least one month after it is dried. If, as it usually happens on the North Coast, there be a continuance of wet weather or humid conditions when harvesting or curing operations are in progress, then a considerably longer time must be allowed. It is much easier to work millet that has been in stock for several months or years than to manipulate new millet.

Though there are many grades of millet brooms, the principles involved in the making of each are the same, the chief points of difference being the better quality and length of millet used, and the extra finish in the making of the complete broom. For the purpose of this article, the general remarks will be confined to the making of the best (Gold Lock) quality broom, and with the conditions that are likely to exist on an ordinary farm. For big factories there would of necessity be a substantial increase in the power

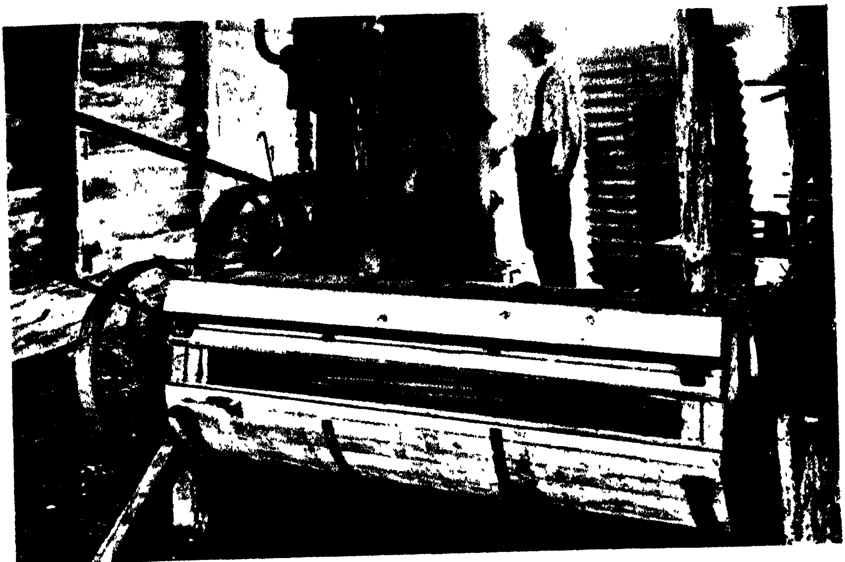


Fig. 5. The Rumbler in which the handles are smoothed after leaving the lathes.

Fig. 6.— The Topping Machine in which the ends of the handles are rounded off. Circular saw bench on extreme right.

BROOM-MAKING ON THE FARM.

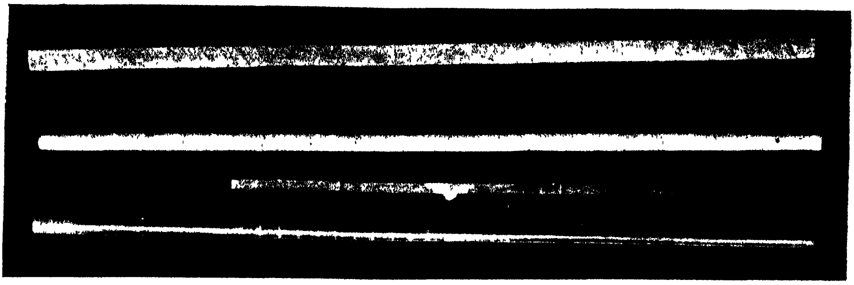


Fig. 7.—Broom-handles.
a Rough. *b* Rounded and smooth. *c* Stained and varnished

Fig. 8.—Stack of Broom-handles being seasoned.

plant, machinery, and working capital; and the employment of many hands continuously throughout the year would naturally lead to greater dexterity, and consequently increased output.

Handles.

The handles for brooms should be cut from good straight-grained pine, in sizes 3 ft. 6 in. by 1¼ inch square. They should be well stacked in heaps under cover, where they can dry thoroughly, and be well seasoned. Under these conditions nice straight handles will be produced. The use of scrap timbers, which to the millowner would be otherwise waste, does not turn out nice straight handles. Curly grain, wood knots, sap wood, &c., with bad seasoning, lead to crooked, twisted, or windy handles that are unpleasant to use. Of course, this class is cheaper than the best, but they are also incapable of being finished off in a satisfactory manner. There are numerous varieties of our softwood timbers that flourish in the scrubs that are not looked upon at present as being of commercial value, which are admirably suited for broom handles. Arrangements could be made either to have the handles cut by a mill proprietor, or to have the logs cut into planks 1¼ inch thick and delivered. With a circular-saw bench there would be little difficulty in ripping these down into handles in spare time. The same bench would be found very useful with change of saws for cutting into small lengths the firewood required for home use and the steam boiler, if the latter were in use. It is well to always have a good reserve of seasoned handles to fall back on.

The first process is to turn the handles in a special broom handle lathe. They are reduced to about 1⅛ inch diameter at the butt end, and tapered off to about ¾ inch at the small end. The rounding of the handle throughout its entire length effects a considerable saving of time, as the machine automatically throws the handle out when the cutter has travelled the full length. The leaving of a square end does not in any way increase the efficiency of a broom, and does not permit of so many handles being turned out. With sharp cutters, the handle, after it has passed through the lathe, has a certain roughness which it is desirable to get rid of. This is brought about by placing them in a large cylindrical barrel called a rumbler. This machine is quarter filled with the handles, the lid is closed and kept in position by bolts and nuts, the belt put on, and it is then caused to revolve very slowly for about two hours. The rumbler is 5 feet long, inside length, and the slow movement causes the handles to revolve against each other, and in so doing all roughness is removed, and a better finish is given than could be obtained by the free use of sandpaper. The rumbler, with a sufficient quantity for good polishing, would hold about 250 handles. Care must be exercised that the machine is not driven at too high a speed, otherwise the handles would be held against the side of the rumbler by centrifugal force, and the handles would be taken out in a similar condition as when first put in. After passing through the rumbler, the small ends of

the handles are inserted for a moment in the topping machine, which travels at a high rate of speed. This rounds off the end and they are then ready to be passed on for making the broom. Handles required for making the best brooms are now stained with different graining designs and colours, and when properly dry are varnished. Though it does not affect the general utility of the broom, it gives to it a finish which greatly enhances its general appearance. The approximate cost of ready-made handles may be put down at about £2 10s. per thousand.

Preparing the Brush.

The millet required for working up should be graded into two main classes —short and long. These two classes can then be conveniently divided again, making in all four grades. These may be described briefly as follows:—

1. Brush generally not more than 17 inches long, with from 2½ to 3 inches of stem attached.
2. Brush a little longer than No. 1, with 2 inches of stem.
3. Brush from 20 inches to 24 inches, with stems cut off.
4. Brush 24 inches long, with stems cut off.

A sufficient quantity of each of the above grades should be got ready. In its dry condition the brush is fairly hard and brittle. It will neither stand acute bending, nor the binding of the wire. However, these difficulties are readily overcome by steeping the ends of the bundles into boiling water for about ten minutes. It is only necessary to treat the ends that are to be attached to the handle. An ordinary copper which is generally available on the farm may be used, the water kept at a constant boil, and a bag placed over the top to help to keep the steam in. A quantity of each grade, sufficient for, say, two or three dozen brooms, may be treated at once. This boiling or steaming softens the brush, rendering it pliable and tough. It can then be bent as desired, and will not cut when being bound with wire to the handle. Each grade can then be placed on a bench and kept separate by inserting iron rods in the bench, or using wooden battens.

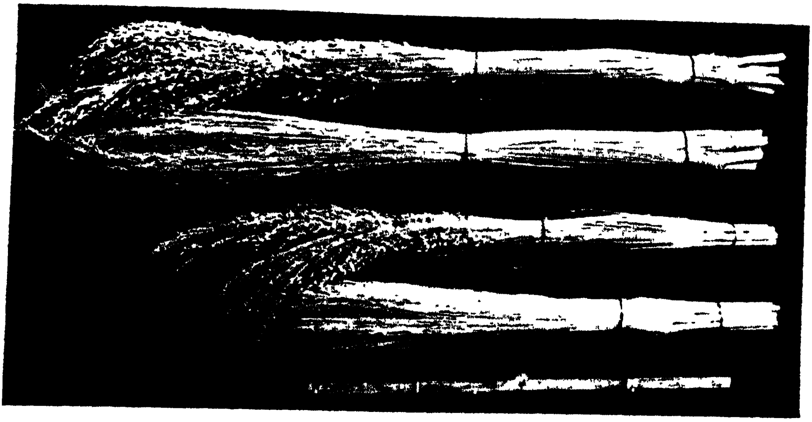
Wiring Machine.

The wiring machine is used to fasten the brush to the handle. It consists of a wooden frame properly braced, two spindles with pulleys attached, drums for holding the broom wire and giving it the necessary tension, and a table upon which the various grades of brush necessary for making a broom are placed near the operator's hands, and kept separate. At the top of the machine one of the spindles consists of a pipe sufficiently large enough to admit of the free passage of a broom-handle. At one end a small pulley is fastened to accommodate a belt which works on the larger pulley on the lower spindle. The handle is inserted in the pipe, and secured in position by a thumb-bolt which clamps the handle against the inside of the pipe. Specially shaped iron adaptors are used to keep the handle central, and fit round the handle so as to prevent damage by the bolt. This handle with spindle is free to rotate as required.

Fig. 9.—Hand-power Hackler for removing the seed from the brush.

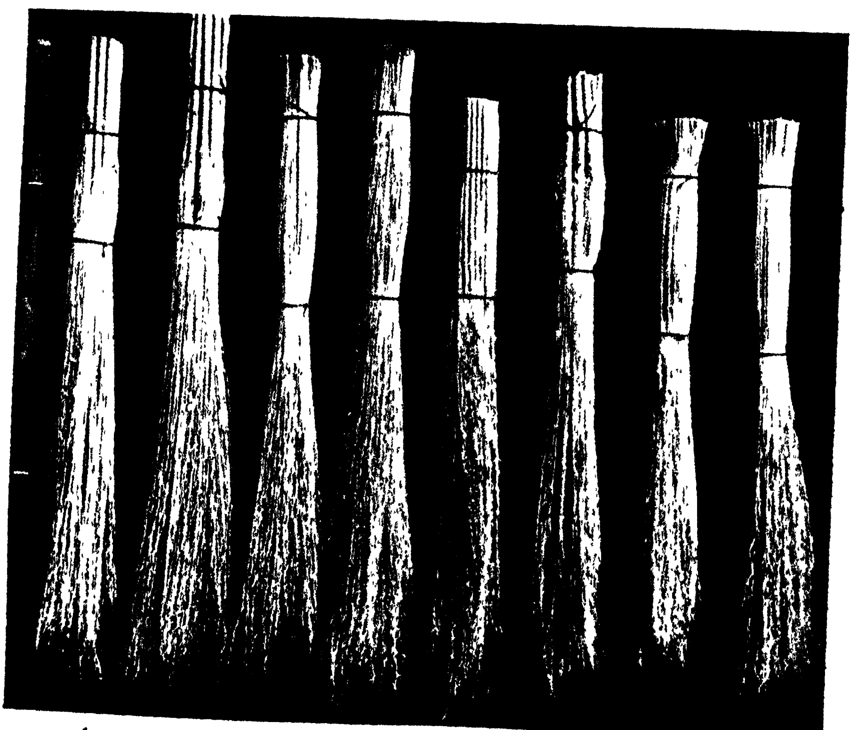
Fig. 10.—Typical samples of brush frequently seen in an average crop. Unsuitable for sale or manufacture.

BROOM-MAKING ON THE FARM.



a
b
c
d

Fig. 11. Samples of good millet in seed and cleaned.
a and *b* Long hurl. *c* and *d* Covers.



1 2 3 4 5 6 7

Fig. 12.—Nos. 1 to 4. Grades for making best quality brooms.
Nos. 5 to 8. Grades for making 2nd quality brooms.

BROOM-MAKING ON THE FARM.

Fig. 13.—Wiring Machine. Showing the first stage in making a broom.

Fig. 14.—Wiring Machine, showing second stage. The butts of the brush are shaped to form the shoulders of the broom.

Fig. 15.—Third stage. Showing the shoulders being made.

Fig. 16.—Fourth stage. Broom ready for sewing.

On the bottom is another spindle with large pulley at one end, and an arrangement consisting of a number of wooden studs, by means of which the spindle can be made to revolve by means of pressure exerted by the foot. This enables the workman to use foot-power to cause the handle at the top to turn round as the brush is being wound on to the handle. The power is transmitted by means of a belt, as shown in the illustration. At one end of the machine near the bottom the wire is wound on to a drum, and from here the necessary tension is obtained by winding it a turn or two round a couple of other wooden drums or pins. The wire used is 19½ gauge tinned steel, similar to that used in the manufacture of ordinary spring mattresses, and costs about 32s. 6d. per cwt. Small nails, ¾ of an inch, and 16 gauge, are used to secure the ends of the wire to the handle. After the handle has been placed in position the wire is fastened to it, and the right tension secured The operator stands in position with one foot on the drum of the bottom spindle, and takes a small handful of the short (No. 1) grade millet, sufficient to form one thin layer around the handle. As the ends of the brush are placed in position, the handle is made to revolve by means of pressure of the foot below, and in so doing the ends are securely held in position by the wire which is wound round. The ends are then trimmed or pared off with a sharp knife. The ordinary bootmaker's knife will be found a useful instrument for this purpose. In the second stage more brush (No. 2 quality) is wound on in a manner similar to the first. The stem ends are now cut, so as to form the foundation for the shoulders of the broom. This is done by paring the two opposite sides close in against the handle, and leaving the other opposite sides somewhat long. The ends of the brush will naturally be bent outwards by the pressure of the wire in binding. In the third stage the No. 3 grade brush, *i.e.*, brush with the stem ends cut off, is used, or, if the long brush is not too plentiful, No. 2 grade, *i.e.*, with short stem ends left on, may be used instead. As will be noticed in the illustration, the shoulders are formed by bending the brush over the projecting end left in the second stage, and a little is also placed on both sides. As each successive lot is bound on the brush is brought up the handle a little farther each time. At this stage, it will be necessary to keep the ends of the brush together by placing a light strap or stout piece of twine around it The ends of this layer are now pared off neatly, fairly close to the handle, so as to receive the final covering of hurl, and not make the neck too bulky. The fourth stage finishes the broom as far as the brush itself is concerned. The fourth or best quality hurl is used for this purpose. It is placed evenly around the whole broom, so as to form a neat and complete covering. For best quality (Gold Lock) brooms, the velvet used to cover the neck is now bound in, after which the wire is finished off around a nail driven in to the handle. The extreme edge is then neatly trimmed off. About 1½ lb of brush are required to make a good broom. Some manufacturers use as much as 2 lb., but it is not advisable to make them too heavy. Other things being equal, the greater the amount of millet used the greater the life of the broom.

The next operation is to fasten on the gold lock, a small piece of specially stamped metal to cover the edge of the brush, and forming with the velvet a neat finished appearance. The broom is now ready to be sewn. For this operation the broom is held in a specially designed vyce, which is clamped up sufficiently tight enough to give the thin flattened formation. The twine used is known as broom twine, of different colours, mostly red and blue, and costs about 1s. 3d. per lb. The twine is wound around the broom twice, and then with a needle it is sewn through the entire width. The ends are cut flush with the broom, and the pressure of the broom itself, after being freed from the vyce, securely holds the twine, and thus there are no unsightly knots showing. The broom is sewn in either three, four, or sometimes five bands, according to the quality of the broom, and the fancy of the maker.

The broom is now ready for the guillotine, which consists of a frame that carries a keen edged blade, which is raised and lowered by connecting rods attached to two cranks on a spindle at the top. A properly faced wooden block is placed underneath the knife, at the proper height, and with its surface parallel with the blade. Two fly-wheels on the spindle give the necessary momentum to cause a clean cut when pulled sharply round by the operator. In order that all the brooms will be cut the same length, a gauge is provided on the platform that carries the broom. A couple of nails keep the handle in proper position so that the ends are cut square, and a piece of bent galvanized iron, with gauges for holding the shoulders, ensures the broom being trimmed at the proper and a uniform length.

The broom is now finished and ready to be done up in bundles for despatch. They may be bundled in half dozens or dozens as desired. One simple manner is to sew the edges of half a dozen brooms together, and then tie the handles together.

It is convenient to manufacture several grades. The best quality are known as Gold Lock, the next grade Spiral No. 1, then No. 2, No. 3. The Gold Lock has longer, better, and more millet than the other grades, and there is a better finish all round, including stained and varnished handles. The poorer quality brooms have plain unvarnished handles, with a minimum amount of millet.

In addition to the making of ordinary brooms, a little attention might also be given to the manufacture of whisks, cobweb brooms, and small brooms useful as presents for children. Though there would not be anything like the same demand for these articles, a quantity of millet too short for ordinary brooms could be utilized, and there would also be a limited sale for them.

In the manufacture of all these articles sound honest millet only should be employed. Under these conditions there will be no necessity to adopt the practice of treating brush before making up with different coloured dyes, to compensate for neglect in some branch of the harvesting or baling

Fig. 17.—Broom held in vyce for sewing.

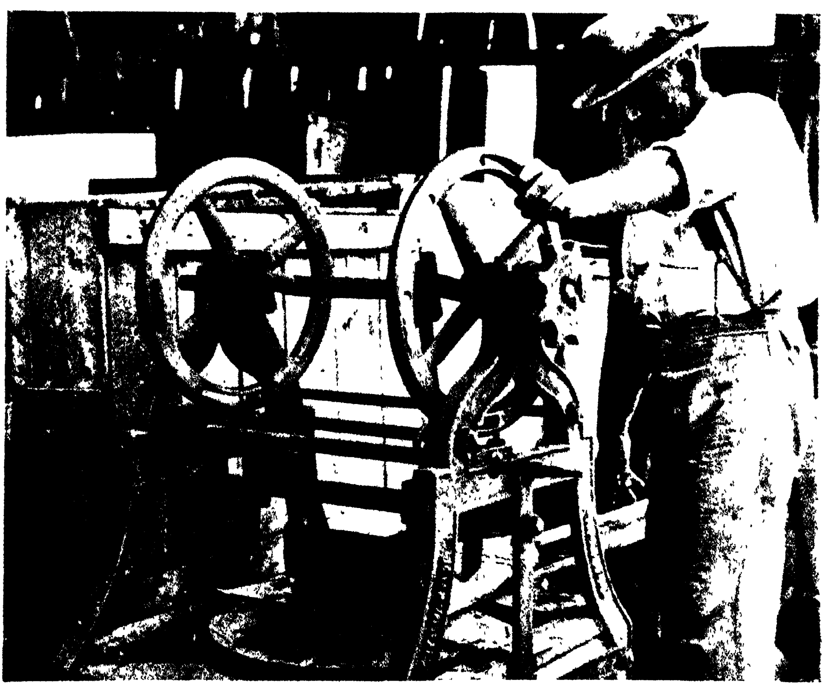
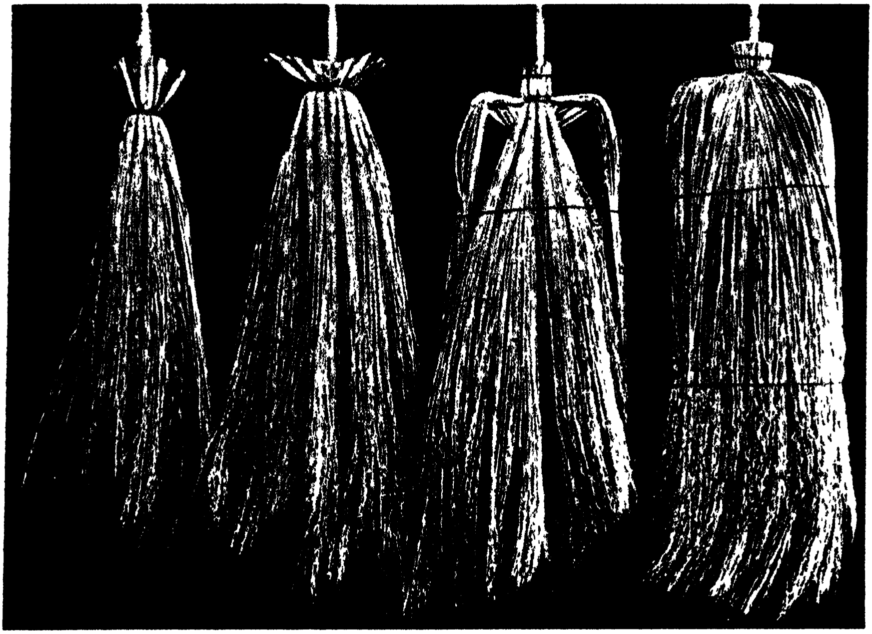


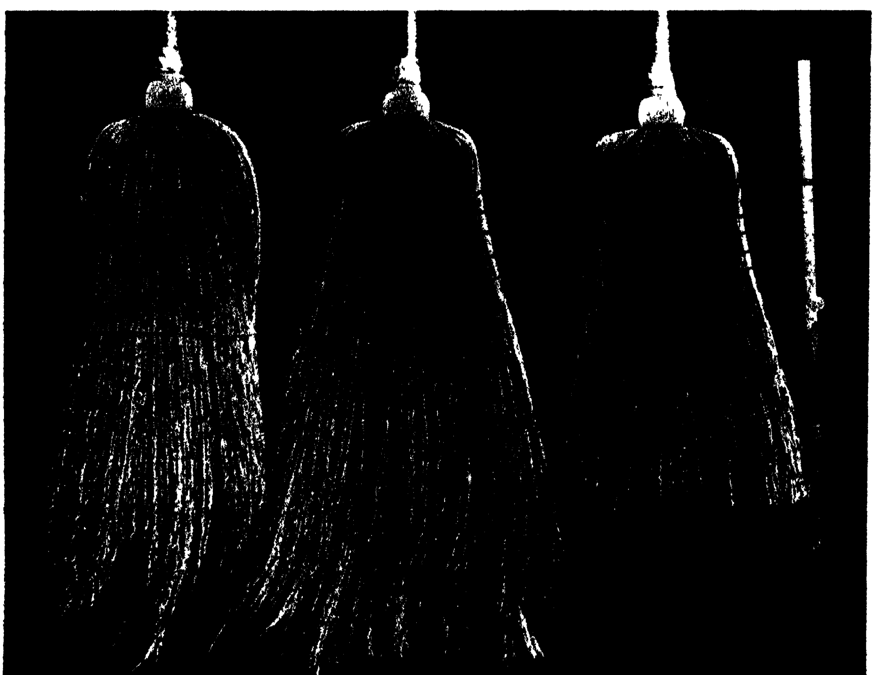
Fig. 18.—The Guillotine. The ends of the broom has just been cut off and the broom is now finished.

BROOM-MAKING ON THE FARM.



1 2 3 4

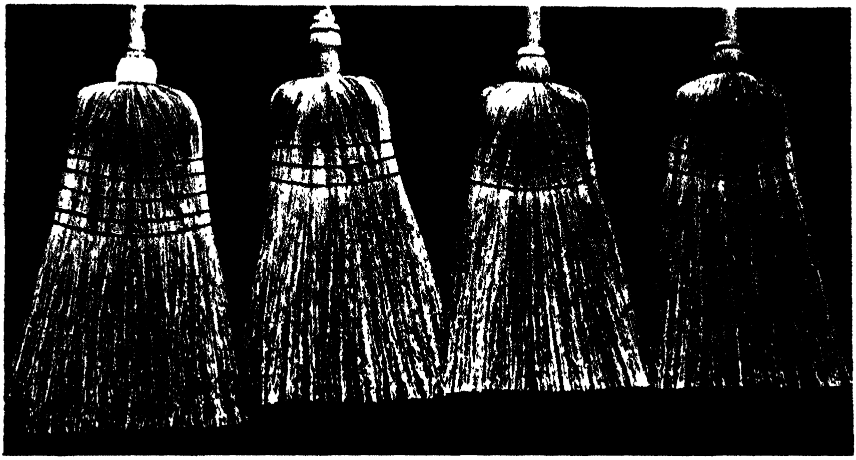
Fig. 19.—Showing the first, second, third and fourth stages in broom-making.



5 6 7

Fig. 20.—Showing (5) the velvet and gold lock; (6) broom sewn; and (7) the finished article

BROOM-MAKING ON THE FARM.



1 2 3

Fig. 21.—Grades of Brooms.

(1) Gold Lock (best quality)
(2) Spiral No. 1.
(3) Spiral No. 2
(4) Spiral No. 3.

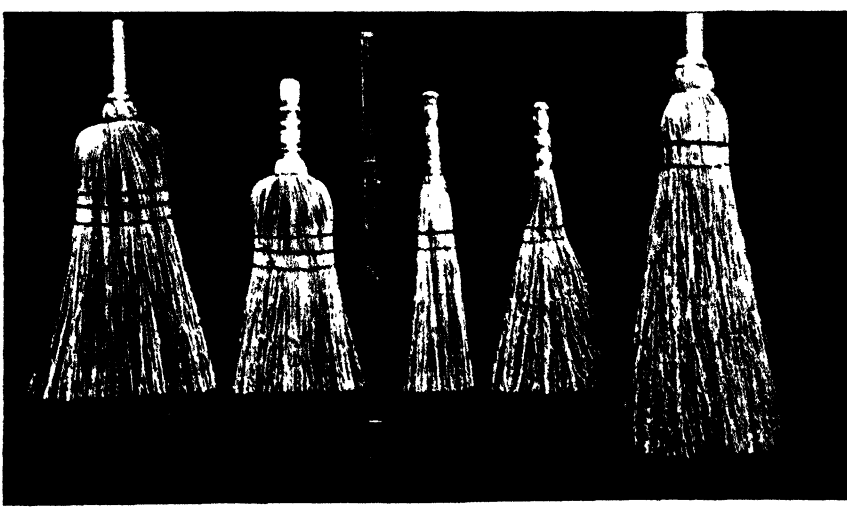


Fig. 22.—Samples of small brooms, whisk, cobweb broom, &c.

BROOM-MAKING ON THE FARM.

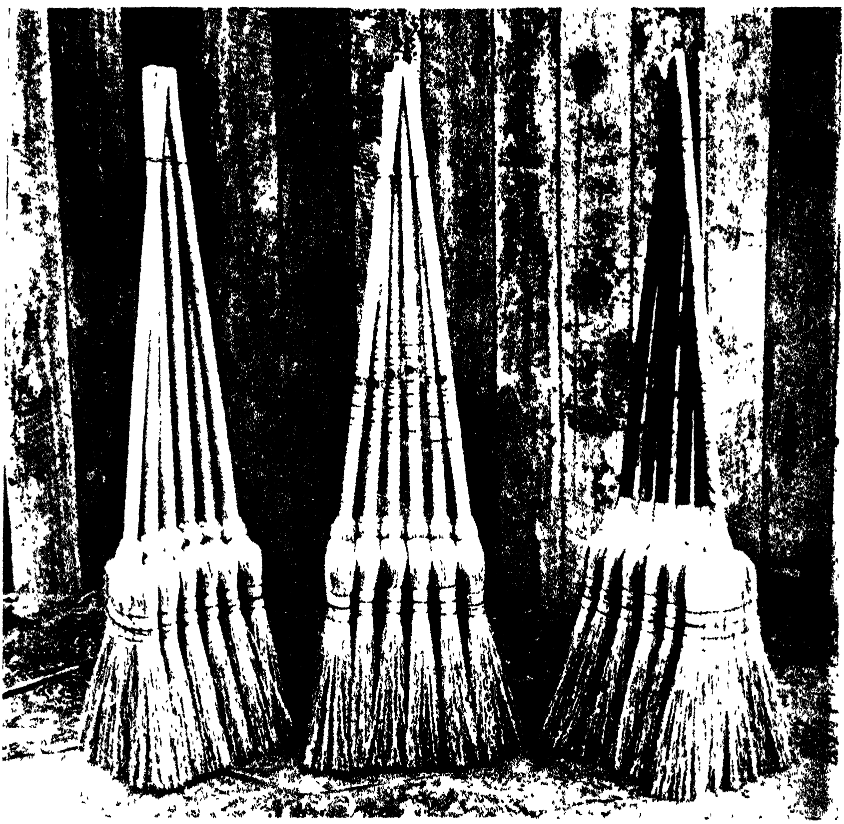


Fig. 23.—Brooms packed in half-dozen bundles ready for despatch.

BROOM-MAKING ON THE FARM.

of the millet. If the cultivation of broom millet is carefully carried out, there need be no difficulty in producing millet, and in manufacturing brooms, of a perfectly natural light greenish or fine golden colour as desired, and to maintain either of these colours in a uniform manner throughout the season.

A suitable finish to the broom should be given in pasting on the handle a tastefully designed trade-mark, with the manufacturer's name and address.

In the establishment of an industry such as broom-making there are quite a number of details that cannot be fully explained in an article of this nature, and which it would be necessary to learn by practice. It would not, however, take very long to overcome these little obstacles: and to anyone contemplating the taking up of this line of work, it would be highly desirable for them to arrange for practical instruction at the hands of a competent and successful broom manufacturer. When this is accomplished, it will be found that the growing of broom millet can be made a very profitable crop, and that the profits from this source can be substantially increased by the farmer manufacturing for sale his own brooms, instead of disposing of his crop in constantly fluctuating and uncertain markets.

The installation of a suitable plant need not be made very expensive; but it would be advisable to have a small steam-engine or boiler to work part of the plant. As most up-to-date farms are usually equipped with motive power of some sort, it merely requires suitable connections to be made to adapt it to working the broom plant. The principal use to which power is necessary is for driving the seed-stripping machine and handle-making machinery. A little experience would soon enable the farmer to judge as to what acreage of crop he could comfortably manage, and the quantity of brooms he could manufacture. It would not be necessary to make up all the millet produced each year, unless circumstances warranted it. On the other hand, if the demand exceeded the supply the farmer might arrange to purchase the whole or portions of the crops of neighbours to advantage, in order to satisfy local trade requirements. As business and trade connections increased, improved labour-saving machinery can be added to the plant as required, or, if thought necessary, a syndicate could be formed, and the operations greatly extended by developing it into a co-operative company.

The accompanying illustrations were obtained from specimens arranged by Mr Albert Marsh, Palmer's Channel, Clarence River, a successful millet grower and broom manufacturer, who has worked up a good connection from a small beginning, and performs the whole of the work under what may be termed "farmer's conditions." The writer is also indebted to this gentleman for a quantity of information contained in the text.

Rhodes v. Paspalum for the Riverina.

A correspondent recently asked certain questions regarding the relative merits of Rhodes and Paspalum grasses for the Riverina. The following reply by the Agrostologist to the Department will be found of interest:—

The conclusion drawn from the controversy, Rhodes *v.* Paspalum, and from other experiences, is that Rhodes is the better grass for lighter soils and under dry conditions. Paspalum is better adapted to alluvial or basaltic soils, and a good rainfall.

The answers to the questions asked are as follow :—

1. *Question.*—Would Rhodes be a suitable grass for sheep fattening?

Reply.—Yes ; this grass belongs to the *Chloris* family, all of which are considered good sheep grasses.

2. *Question.*—Would Rhodes do well in Riverina, near Moama?

Reply.—In all probability, yes. Rhodes grass has been tried at Wagga Experiment Farm under similar, and perhaps not quite as good conditions, as those existing in the Riverina, and it gave favourable results.

3. *Question.*—Would it do well under irrigation?

Reply.—Yes ; this is demonstrated by the experience at Yanco Experiment Farm. This grass, however, does not require the same amount of irrigation as other grasses, such as Paspalum, Cocksfoot, &c.

4. *Question.*—How many lb. of seed per acre are necessary?

Reply.—3 or 4 lb. Care should be taken that the seed is fertile, and it would be advisable to test it before sowing. The seed is very light, and its appearance would, without close examination, deceive a buyer.

5. *Question.*—The soil is sandy loam of a somewhat silty character, commonly called "river flats." Would it be benefited by, say, 56 lb. superphosphate per acre?

Reply.—No superphosphate should be required for the first sowing.

6. *Question.*—Is it considered a good grazing grass?

Reply.—The data with regard to its grazing capabilities are limited in character. It appears, however, that Rhodes will not stand as much grazing as Paspalum, and periodically it requires a rest. This does not mean that it is considerably affected by trampling, but that its aftermath is somewhat slower than that of

7. *Question.*—Would water lying on it for, say, a week or ten days, in a depression or swamp, destroy it?

Reply.—Winter water lying on it for some time may affect it, but it should certainly stand submerged for a week or fortnight under summer conditions.

It is quite true that Paspalum can be submerged for some considerable time without injury, and it is doubtful if Rhodes can stand as much.

I would personally recommend Rhodes grass with or without irrigation, in preference to Paspalum, in such a district as that mentioned. Without irrigation, Rhodes grass is superior in every way, while with irrigation, although Paspalum produces a superior bulk of feed, its obnoxious habit of spreading and matting the ground renders it difficult to remove when required. This does not occur to nearly the same extent with Rhodes grass.

The latter is very sensitive to frosts, and the custom at Wagga Experiment Farm is to sow the seed in the spring after danger of frosts is past. By ploughing the land in the autumn and rendering it receptive to the winter rains, it should be in good condition for sowing in the spring.

A Descriptive Catalogue of the Scale Insects ("Coccidae") of Australia.

[Continued from page 319.]

WALTER W. FROGGATT, F.L.S., Government Entomologist.

Genus II. *Aonidia*, Targioni-Tozzetti.

Catalogue Coccidæ, p. 42. 1869.

THIS genus contains species that have the female scale formed almost completely of the second pellicle which, when the female coccid moults, covers her with only a slight rim of secretionary matter round the margins, thus the female scale is double the first pellicle superimposed in the centre of second one. The adult female is reduced in size and remains under the second pellicle. Thus the form of the different species of the genus depends upon the shape of the second cast skin (pellicle) varying from subcircular to oblong oval.

Under this pellicle the female when full grown shrinks to half her ordinary size and deposits the living larvæ in the cavity behind. The male scale resembles that of the female and is of about the same size, and consists of the central first pellicle surrounded with secretionary matter forming a regular scale. About twelve species have been described, chiefly from Ceylon, India, and Mauritius; one (*Aonidia lauri*) has been described from Europe, on the Laurel.

Aonidia banksiæ, Fuller.

Notes on Coccids of W. Australia. 1897, p. 11.
Trans. Entom. Society of London, p. 473. 1899.

This scale was recorded by Fuller as common upon the foliage of *Banksia attenuata*, *B. menziesii*, and *B. prionotes* in the neighbourhood of Perth, West Australia, and occasionally upon the foliage of *Banksia ilicifolia*. The female scale is circular and convex, of a general grey tint, with the second pellicle showing through the secreted portion which gives it a deep orange red colour. Diameter 0·02 mm. Male scale white to grey, pellicle, terminal, circular, bright orange colour, on each side of the centre two groups of pores.

1355. *Aonidia banksiæ*. Cat. Coccidæ, p. 302.

Aonidia (Greeniella) pulchra, Green. (Pl. III, fig. 3.)

Victorian Naturalist, vol. xxii, p. 4, figs. 2, 3. 1905.

The female scales, together with the males, were found upon the undersurface of the leaves of *Callistemon salignus* by Mr. Lidgett, at Myrniong, Victoria.

The female scale is almost circular, strongly convex, in fresh specimens having the surface covered with a coat of greyish brown or white secretion which scales off, together with the first or larval pellicle, leaving the second pellicle, which, with the addition of a slight rim, composes the true female; scale is then shining reddish brown. Diameter, 0·75 mm.

The male scale is larger than the female, more flattened, and oval; the basal portion attached to the leaf grey or almost white, with the apical portion (the larval pellicle) reddish yellow, forming a remarkable cap, more yellow in the centre, with a fringe of curled glassy white filaments right round, giving them a very beautiful appearance.

Green says: "There are usually four of these processes on the median line, two on each side above the thorax, and twenty-two forming a marginal fringe. These processes are often broken and imperfect. Length, 1 mm.; diameter, 0·75 mm."

Genus III. *Parlatoria*, Targioni Tozzetti.

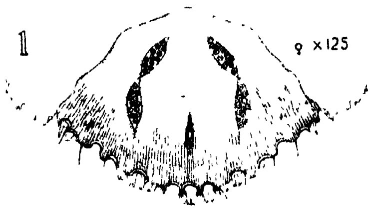
Catalogue, p. 42 1896
Green, *Coccidæ of Ceylon*, pt. ii, p 162. 1899.
Newstead, *Mon British Coccidæ*, vol i, p 139. 1901

The members of the genus are allied to those in the genus *Aonidia* in having the second pellicle of the female large In some species it comprises most of the puparium, with only a narrow margin of secretionary matter; in others, however, this secretion is much more plentiful. "The female scale is variable, it may be subcircular, ovoid, or elongate The pellicles overlapping each other and well inside the margin at or towards the anterior extremity."

The male puparium oblong and narrow, sides subparallel with a median depression on the posterior half. The single pellicle placed at the anterior extremity. Secretionary area usually of the same colour and character as that of the female scale, but intermediate in this respect between the two groups, of which *Aspidiotus* and *Diaspis* may be taken as typical genera. A somewhat cosmopolitan genus, comprising about seventeen species, well represented in Ceylon, China, and Australia

Parlatoria destructor, Newstead. (Pl III, figs 1 and 2)

This species was collected some years ago by Mr. C. French upon an apple in an orchard near Melbourne, Victoria Professor Newstead made out a description of this new species, and furnished a drawing of the female, now reproduced. Nothing was done with this description given to French in 1904. When Mr. C French, jun., knew that I was listing the Australian *Coccidæ* he sent me the description and plate, and the following is Newstead's MS. description of this species:—"Female puparium, elongate oval, the front margin round, formed of the large dark brown second pellicle, with the small greyish brown keeled first pellicle superimposed, the white secretionary matter forming a thin rim in front and a lance-shaped projection behind; convex, length, $\frac{1}{25}$ inch. Adult female smaller than second stage female, peg-top shape; rudimentary antennæ with a strong-curved spine; rostrum large, mentum small; pygidium well defined; margin deeply crenulated;



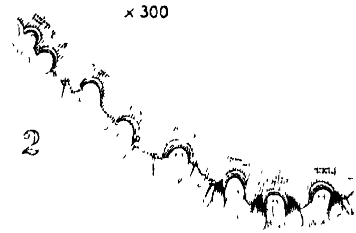


Fig. 1 **Pygidium of** *Parlatoria destructor* (Newstead.) **Fig. 2.—Fringe of** *Parlatoria destructor*. (Newstead.)

(*Drawn by R. Newstead.*)

Fig. 3 – *Aonidia pulchra*.

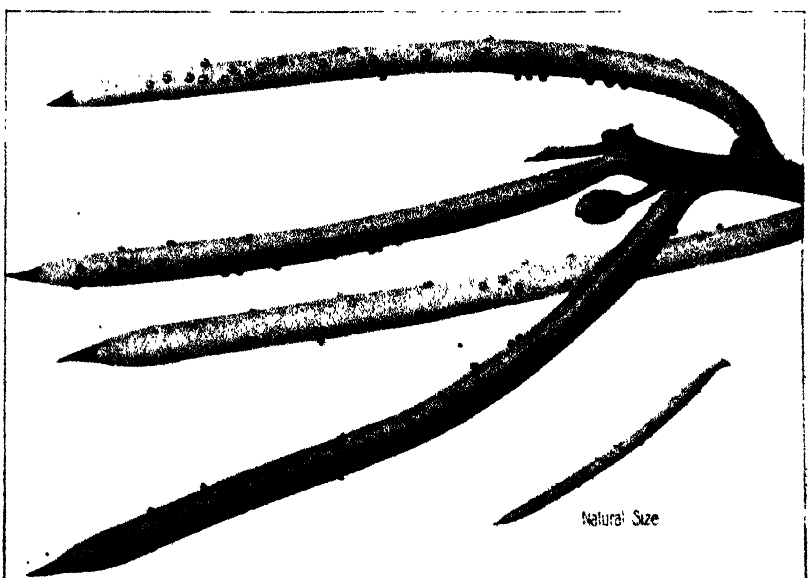


Fig. 4.—*Gymnaspis perpusilla*.

Scale Insects of Australia. Plate III.

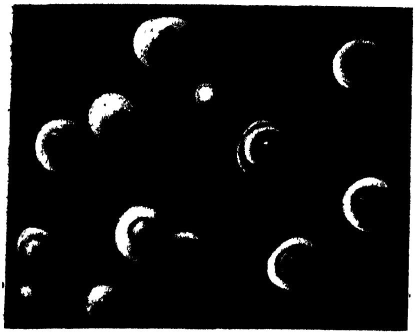


Fig. 1.—*Gymnaspis acaciæ*, n sp.

Fig. 2. —*Mytilaspis bicornis*, Green.

Fig. 3.—*Mytilaspis chitonosa*, n.sp

Fig. 4.—*Mytilaspis citricola*, n sp.

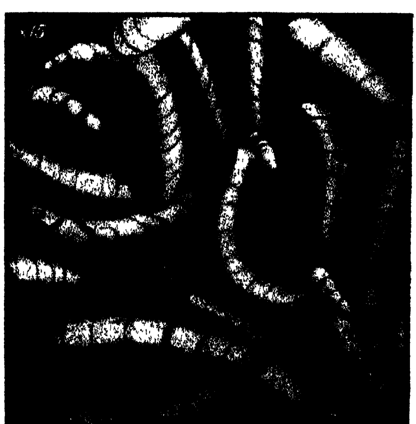


Fig. 5.—*Mytilaspis eucalypti*, n.sp.

SCALE INSECTS OF AUSTRALIA. Plate IV.

circumgenital glands in four groups, each consisting of ten or twelve glands; dorsal tubular spinnerets irregularly arranged just within the margin; anal opening a little below the centre; vaginal opening apparently just below the anterior groups of spinnerets; lobes in two pairs, median pair largest, faintly trilobate; second pair notched on the outer margin; plates terminally divided; the pair between each of the lobes are forked and the rest are irregularly divided."

This species may be recognised from all others by the character of the fringe of the pygidium in which there are but two pairs of lobes, and by the forked character of the marginal plate. It fits in well with Leonardi's subgenus *Websteriella* which includes *Parlatoria zozypium*, *P. anidiformis*, and *P. blanchardi*.

Parlatoria dryandræ, Fuller.

Journal of Agriculture, W.A., vol. iv, No. 17, p. 1344. 1897.
Trans. Ent. Soc., London, p. 467. 1899.

Found upon the foliage of a native shrub (*Dryandra floribunda*) near Perth, West Australia.

Scale of female elliptical, exuviæ terminal. Length 0·05, width 0·03 inch. First pellicle brown, second darker, one third the whole length; secreted portion of the scale pinkish grey, finely punctate. Male scale similar tint with pellicle brown. Length 0·03 inch. Adult female brown; antennæ rudimentary, lobes, plates, and spines round the margins; four groups of circumgenital glands.

1439. *Parlatoria dryandræ.* Cat. Coccidæ, p. 319.

Parlatoria myrtus, Maskell.

Trans. New Zealand Institute, vol. xxiii, p. 12, pl. 1, figs. 10-12; vol. xxviii, p. 383. 1896.

Collected upon the foliage of *Myrtus communis* and *Viburnum sp.* in Victoria, and from near Adelaide, S.A., fairly common upon the foliage of *Laurustinus*, though doing slight injury.

Female puparium light yellowish brown to whitish, pellicles dark green; pyriform flat; the pellicles terminal. Length, $\frac{1}{10}$ inch. Male puparium similar in colour but smaller, narrower, not carinated. Adult female brown, elongated, broadly rounded at tip of abdomen, terminating in six lobes and fringe of scaly hairs; four groups of spinnerets.

1440. *Parlatoria myrtus.* Cat. Coccidæ, p. 319.

Parlatoria petrophilæ, Fuller.

Trans. Ent. Soc. London, p. 468. 1899.

Obtained upon the foliage of two native shrubs, *Petrophila linearis* and *Hakea ilicifolia.*

"Female scale slightly convex, very wide, slate grey; first pellicle dark brown terminal, and comparatively very small. Length 0·08; width 0·05 inch. The second pellicle is circular and not less than one-quarter of the entire length of scale. The faintly notched lobes, the small pellicle, and the wideness of the scale seem to characterise it."

1443. *Parlatoria petrophilæ.* Cat. Coccidæ, p. 320.

Parlatoria proteus, Curtis.

Aspidiotus proteus. Curtis, *Gardener's Chronicle*, p. 676. 1843.
Diaspis parlatorus, Targ. *Stude sub Coccidæ*, p. 14. 1867.
Parlatoria obicularis, Targ. Cat., p. 42. 1869.
Sign. Ann. Soc. Ent. France, p. 450. 1883.
Douglas, *Ent. Monthly Magazine*, vol. xxiii, p. 241. 1887.
Maskell, *Trans. New Zealand Institute*, vol xxv, p. 231. 1887.

A cosmopolitan species with a very wide range, its original host appears to be the date-palm, and its native home the East, but it has been spread far and wide on hot-house shrubs, and is now found upon a great number of different kinds of shrubs and orchard trees; among those upon which it has been recorded are *Macrozamia*, *Pinus insignis*, *Myrtus*, *Camellia*, and *Citrus*, and it is found in North and South America, Europe, Northern Africa, China, Japan, Hawaii, and Australia.

In Mrs. Fernald's catalogue the allied species, *Parlatoria blanchardi*, is recorded from Australia on the authority of Cockerell, who published a paper in the *Entomologist*, 1896, where he describes this species as a new one under the name of *Parlatoria victrix* from Australia, upon date-palms, which Maskell had previously determined as this cosmopolitan species. Cockerell gives no information as to what was wrong with Maskell's determination of this scale, which probably came to South Australia with the date-palms from Algeria.

I have also found specimens upon *Pinus insignis* growing in the Botanic Gardens in Sydney, though the scales were much smaller than the typical form, a fact that Maskell attributed to smallness of the pine needles. It was also recorded from Brisbane, Queensland, upon apple-trees in 1892 by Maskell.

Puparium of female elongate ovate, usually narrow behind, convex, when crowded together, as is often the case, pyriform; colour variable, often partaking of the colour of the leaf, greenish yellow, with the pellicles darker. Female circular; colour, pale purple; pygidium short but broad, crenulated with three well developed lobes. Male scale elongate, dull yellow, convex.

In speaking of the character of *P. myrtus*, Maskell says, "has the same scaly hairs on abdomen as *P. proteus*, but the spinneret orifices are less numerous, and the puparium differs. I have satisfied myself that *P. pergandi* is quite different." In *P. proteus*, Douglas says that the second pellicle is long, oval, and conspicuously large. This character applies to *P. pittospori* but not to *P. myrtus*.

1445. *Parlatoria proteus*. Cat. Coccidæ, p. 320.

Parlatoria pittospori, Maskell.

Trans. New Zealand Institute, vol. xxiii, p. 11, pl. 1, figs. 5–9. 1890.

Upon the foliage of *Pittosporum undulatum* from near Melbourne, Victoria. The puparium of the female varies from dark greenish grey to almost black, pellicles green; general form, sub-elliptical flattened. Length, $\frac{1}{25}$ inch. Female coccid dark brown, sub-elliptical, with posterior extremity broadly rounded; with six trifoliate lobes with broad scaly hairs between; four groups

of spinnerets. Male scale elongated, not carinated; pellicle terminal, smaller than female. Maskell says that the female coccids of each species of the genus *Parlatoria* differ very slightly in the character of the lobes and fringe.

1444. *Parlatoria pittospori.* Cat. Coccidæ, p. 320.

Parlatoria viridis, Fuller.

Trans. Ent. Soc., London, p. 467. 1899.

Taken upon the leaves of *Pittosporum sp.*, near Perth, W.A. Fuller says: "Female scale elongate, rounded behind, form constant, pellicles terminal, naked, brown, first one-third the size of second, the latter viridean green, oval, and equal to half the length of the whole scale; secreted portion is occasionally light brown against the second pellicle. Length, 0·06 inch. Male scale elongate, slightly convex; pellicle terminal, viridean green, rest white. Length, 0·04 inch. It causes a yellow stain upon the leaves, and affects the growth of infested plants."

Female coccid brown, roundish ovate; pygidium furnished with three pairs of trilobate lobes; anterior groups of circumgenital pores forming two elongated groups. Length, 0·04 inch.

1448. *Parlatoria viridis.* Cat. Coccidæ, p. 322.

Parlatoria ziziphus, Lucas.

Coccus ziziphus, *Bulletin Soc. Ent*, France, (3) 1, p. xxviii. 1853.
Chermes auranti, *Boisd. Ent. Hort*, p. 338. 1867.
Parlatoria ziziphus, Targ. Cat., p. 42. 1869.

A cosmopolitan species that belongs to the Mediterranean region, and originally described upon the foliage of *Zizyphus pinichristi* (one of the *Rhamnea*) in Algeria and Pau, France. Signoret afterwards recorded it as common upon orange, lemon, and jujube trees, and on these trees has spread into the United States, the Hawaiian Islands, and China. It was found by Lea on imported lemons from Sicily, and identified by Maskell. (*Trans. N.Z. Inst.*, 1896.)

Puparium of female very elongate, black and opaque, composed of the moulted skin of the second stage female, with a more or less well-defined white band of white secretion at the posterior extremity, with the larval pellicle projecting in front of the puparium; 1·25-2 mm. in length. Adult female ovate; rudimentary antennæ and long slender spine above mouth. Pygidium with four pair of lobes and four groups circumgenital glands. Male puparium white, sometimes stained with brown or yellow, very elongate; pellicles black, 1 mm. in length.

1449. *Parlatoria ziziphus.* Cat. Coccidæ, p. 322.

Genus IV. *Gymnaspis*, Newstead.

Entomologists' Monthly Magazine, vol. xxxiv. p. 92. 1898.

This genus was created by Newstead for the reception of a coccid allied to the members of the genus *Aonidia* obtained in the Royal Gardens at Kew (England), on *Æchmea aquileya*, which he called after its food plant.

He defines it "Female puparium without larval exuviæ or secretion; composed entirely of the naked moulted skin of the second stage female.

Male puparium with larval exuviæ and secretionary margin as in *Aonidia*. In his monograph of the British *Coccidæ* he enlarges upon his first definition of the genus, and illustrates the life history of the type species, which he says is now well established in England. He also remarks that Green's Ceylon species *Aonidia bullata* should be included in this genus.

Three species have been described, I now add a second one from Australia.

Gymnaspis perpusilla, Maskell. (Pl. III, fig. 4.)

Parlatoria perpusilla. *Trans. New Zealand Institute*, vol. xxix, p. 299, pl. xviii, figs. 4–9. 1897.
Fuller, *Trans. Ent. Soc. London*, p. 468. 1899.
Cockerell and Parr, *The Industrialist*, p. 278. 1899.

This species was placed in the above genus by Messrs. Cockerell and Parr, Maskell was in some doubt as to which genus it belonged, and says: "This is the smallest coccid known to me; the unaided eye can only just detect on the greenish spikes of the plant some excessively minute reddish specks, which are the puparia. I have placed it in *Parlatoria* on account of the deep serrations of the abdominal margin, and the prominent denticulate scaly hairs, but the puparium is unlike any other with which I am acquainted, and the absence of spinneret groups is abnormal." The female puparium is dark orange, waxy and semi-transparent, very convex, smooth and shining, like little rounded conical caps, scattered all over the spiky foliage. Some (probably males) which Maskell did not find are white on the basal half with a dark brown or orange apex. Adult female with anterior portion smoothly rounded: abdomen distinctly segmented. Colour dark reddish brown; length about $\frac{1}{90}$ inch. The abdomen ends in deep serrations with many broad scaly hairs. No spinnerets. The specimens come from Geraldton, West Australia, on an undetermined species of *Hakea* ("Needlewood").

1368. *Gymnaspis perpusilla*. Cat. Coccidæ, p. 303.

Gymnaspis acaciæ, n.sp. (Pl. IV, fig. 1.)

Scattered over the leaves of the "Weeping Myall" (*Acacia pendula*) at Pera Bore, near Bourke, New South Wales. (Collected W.W.F.)

Female puparium reddish brown, convex but not as conical as in *G. perpusilla*, broader at the base; a number of the scales are covered with a thin incrustation of white secretion. Diameter $\frac{1}{30}$ inch. Adult female, almost circular, with the whole surface chitonous, dull yellow and finely striated on the abdominal segments. Pygidium small with two large clubbed terminal lobes projecting beyond the margin with fine pointed projections on either side of the lobes forming an irregular fringe. Four irregular depressed areas close to the outer margin on either side of the terminal lobes. Mouth parts very prominent.

Genus V. *Mytilaspis*, Signoret.

Ann. Soc. Ent. France (4), vol. viii, p. 841, 1868; and vol. x, 1870.
Comstock, *Report U. S. Dep. Agriculture* 1880, p. 292.
Green, *Coccidæ of Ceylon*, Part I., p. 77. 1896.
Newstead, *Mon. British Coccidæ*, vol. i, p. 194. 1901.

Female puparium elongate or mussel shaped; pellicles at the anterior extremity, the first terminal, second larger forming the basal portion of

puparium. The whole scale formed of hard horny secretionary matter sometimes appearing to be formed in regular transverse layers, the under or ventral surface furnished with a delicate silken-like skin sometimes forming a regular envelope, in others divided down the centre, but sometimes wanting. Male puparium similar in form and structure but much smaller.

Adult female elongate, widest across the well defined abdominal segments; the pygidium with five groups of circumgenital glands, few orifices, and subdorsal; intermediate and tabular spinnerets, with the anal orifice close to the base. After egg laying, the female shrivels up considerably and the apical portion of the puparium acts as an ovisac, protecting the eggs until the tiny larvæ hatch and crawl out. This genus is well represented in Australia by many indigenous species, while several important and serious pest species have been accidentally introduced from other parts of the world.

In Mrs. Fernald's catalogue this well-known genus is replaced by the genus *Lepidosaphes*, but I have retained the old genus. Douglas (*Entomologists' Monthly Magazine*, p. 243, 1886-7) states upon what slight grounds it was proposed to strike out the genus *Mytilaspis*, quoting Prof. Comstock, who says: "It is quite probable that the name *Lepidosaphes* was published before *Mytilaspis*, but I think the former name has no claim to recognition. Schimer made (to him) the wonderful discovery that the scale of the apple tree louse was distinct from the body, and that the tarsal claws bore digitali. These characters, together with the absence of tarsal claws, he thought of sufficient importance to establish a new genus, and to make it the type of a new family. This is the gist of two pages of small print. If *Lepidosaphes* stands for anything it includes the whole of the scale-bearing coccidæ, *i.e.*, the *Diaspinæ*. The name *Diaspis* was proposed for the group by Costa in 1827. *Lepidosaphes* is therefore a synonym of the much older name *Diaspis*, and has no claims to recognition in the subsequent division of the genus."

Mytilaspis acaciæ, Maskell.

Trans. New Zealand Institute, vol. xxviii, p. 387, pl. xix, figs. 1-2. 1896.

The type specimens of this species were taken upon the Slender-leaved Wattle (*Acacia linifolia*) growing at Hornsby, near Sydney, N.S.W. Female puparia clustered over the bark of stems and branchlets dull grey, mussel or pear-shaped. Length, $\frac{1}{16}$ inch. Terminal pellicle small yellow; second pellicle about $\frac{1}{4}$ of the length of puparium. Male puparium similar in shape, smaller, not carinated, lighter coloured than the female, pellicle orange red.

Adult female dark brown, elongated, $\frac{1}{20}$ inch in length. Abdomen terminating in four lobes, median ones largest, wider than long, outer edges crenulated, with conical serration bearing spines. No spinnerets but some large oval pores.

Maskell formed a variety *albida* in the same *Journal* in the following year upon a species from Perth, W.A., on an undetermined species of *Acacia* in which the differences are very slight, simply a lighter colour and the median abdominal lobes smaller.

1371. *Lepidosaphes acaciæ.* Cat. Coccidæ, p. 304.

Mytilaspis auriculata, Green.

Trans. Linn. Soc., London, vol. xii, pt. 2, p. 205, pl. xxi, figs. 14-18. 1907.

Collected in the Botanic Gardens at Adelaide, S.A., upon a Croton. Green states that it appears to be a common scale of the variegated Croton (*Codiæum*) all over the world. He has specimens from Australia, Java, Seychelles, India, Ceylon, and the West Indies.

Green says that it is the common species of this genus upon Crotons, "Coming near *Mytilaspis pomorum*, but differing in the colour of the puparium, and the presence of ear-like lobes at the base of the head."

Female puparium white, pellicles pale yellow or colourless; elongate, narrow, straight on sides (except when massed together), slightly convex. Length, 2 to 2·50 mm.

Adult female narrow at apex, broadly rounded to base, "with an ear-like lobe on each side at base of cephalic area." Rudimentary antennæ well in from outer margins; well defined anterior and posterior spiracles; glandular pores on sides. Pygidium broad, lobes four, small, median pair broadly conical, separated; second pair duplex. Circumgenital glands in five groups.

Mytilaspis banksiæ, Maskell.

Trans. New Zealand Institute, vol. xxviii, p. 388, pl. xix, figs. 3-5. 1896.

This species was described from specimens obtained near Melbourne, Victoria, upon the foliage of a "Honeysuckle" (*Banksia integrifolia*) "growing within full reach of the sea spray."

Female puparium dull rusty buff, like the colour of the underside of the leaf, convex, broadly pyriform, short. Length, $\frac{1}{27}$ inch. Pellicles dull red, often clouded with secretion.

Adult female dark red shaded with yellow in some specimens, the general form often much shorter and more rounded than usual. About $\frac{1}{35}$ inch in length in more normal specimens. Abdomen six-lobed, central ones largest, second pair deeply cut out on the outer edges. Five groups of spinnerets many dorsal spinnerets.

1376. *Lepidosaphes banksiæ*. Cat. Coccidæ, p. 305.

Mytilaspis bicornis, Green. (Pl. IV, fig. 2.)

Victorian Naturalist, v, xvii, p. 9, fig. 1. 1900.

This species comes from Myrniong, Victoria, found upon the bark of *Eucalyptus globulus*, the Tasmanian blue gum.

Female puparium dull reddish brown, with the hind margins whitish. Form normal, dilated behind, often irregularly contorted. Length, 1·50 to 2 mm.

Adult female of normal form, antennæ consisting of a tubercule and fine hair. Pygidium broadly rounded, lobes rather small, often hardly projecting, median pair simple, second pair bifid, with several chitonous projections beyond; many oval pores along the sides, with others on the inner portion. Circumgenital glands in five groups. Specimens obtained on a Spotted Gum

(*Eucalyptus sp.*), from Parkes, New South Wales, were identified as this species by Mr. E. E. Green, who proposed that it might be called *Var. alba* on account of its larger size and whiter colour. This variety has been found on *E. melliodora* on the Plenty River, Victoria (C. French, jun.).

Not listed in Mrs. Fernald's catalogue.

Mytilaspis cassiniæ. Green.

Victorian Naturalist, vol. xxii, p. 4, figs. 4–5. 1905.

This coccid was collected at Myrniong, Victoria, upon the foliage of a native shrub (*Cassinia aculeata*).

The female puparium is long and narrow, sides subparallel, often curved; dull reddish brown; pellicles reddish, almost hidden; length of well developed samples, 2·75 to 3·50 mm.; greatest breadth, 0 50 mm.

Adult female reddish brown; elongate, tip of abdomen truncate, the median lobes large, sloping from each side to a blunt point, lateral lobes duplex projecting, with third pair of lobes broad but hardly projecting. Circumgenital glands in five groups.

Mytilaspis casuarinæ, Maskell.

Trans. New Zealand Institute, vol. xxv, p. 209, pl. xi, fig. 7. 1892.
,, ,, ,, vol. xxvii, p. 45. 1894.

The type specimens were obtained upon the twigs of a She-oak (*Casuarina sp.*), growing in the neighbourhood of Sydney, New South Wales. I have also taken specimens upon the Native Cherry (*Exocarpus cupressiformis*), Crookwell, N.S.W., and Myall (*Acacia sp.*), at Dubbo, N.S.W.

Female puparium snowy white, convex, elongated narrow, length, $\frac{1}{11}$ inch. Pellicles terminal, orange red. The puparia upon the Native Cherry and Myall larger than the type.

Adult female brown elongate, the median lobes represented by a thickening of the margin, which is crenulated on the sides with four or five short hairs; spinnerets numerous; length, $\frac{1}{20}$ inch.

1379. *Lepidosaphes casuarinæ.* Cat. Coccidæ, p. 306.

Mytilaspis chitonosa, n.sp. (Pl. IV, fig. 3.)

Specimens collected upon the Native Broom (*Templetonia egena*), growing near Condobolin, New South Wales.

Female puparium white, long, slender, cylindrical, and usually straight or only slightly curved; length, $\frac{1}{13}$ inch; pellicles pale yellow, but often encrusted with white secretion, narrowed at the apex.

Adult female, light chocolate brown, elongate; pygidium broadly rounded chitonous, with pair of rounded median lobes projecting beyond the margin, with two serrate angular point projections on either side that are apparently not true lobes; edges finely serrate, with scattered hairs; anal aperture rounded.

Mytilaspis citricola, Packard. (Pl. IV, fig. 4.)

Aspidiotus citricola. *Guide to the Study of Insects* (2nd Ed.), p. 527. 1870.
,, ,, Comstock. *Report U.S. Dep. Agri.*, 1880, p. 321.
Mytilaspis fulva, Targ. *Bull. Soc. Ent. Ital.*, p. 84. 1872.
,, *flavescens*, Targ. *Annale R. Minist. Agri.*, p. 84. 1876.
,, *beckii*, Ckll. *Pro. Acad. Nat. Sciences*, Phidel., p. 275. 1899.
,, *tasmaniæ*, Ckll. *Victorian Naturalist*, vol. xvi, p. 14. 1899.

This is the cosmopolitan "Purple Scale," not uncommon in Australia upon oranges. It has also been recorded by Maskell upon Crotons in South Australia, and *Banksia integrifolia* from Victoria. In other parts of the world it is chiefly a citrus scale.

Female puparium mussel shaped, elongate, slightly curved, and flattened at the apical margin; rich reddish brown, with the surface finely transversely rugose. Pellicles large, first exposed pale yellow, second pellicle large, reddish, embedded in the secretion of the scale; 2 to 3 mm. in length.

Adult female whitish, with tip of abdomen yellowish red, elongate oblong; abdomen deeply segmented on the sides. Pygidium with two large median lobes, with a shorter lobe on either side, with indentation below. Circumgenital glands five in number. The anal aperture close to edge of pygidium.

In Mrs. Fernald's catalogue the old name has been abolished and the Purple Scale appears as *Lepidosaphes beckii*, Newman. I have retained the old name for the following reasons: First, Glover and Packard defined this orange scale, which Comstock described in the citrus orchards of Florida. In 1861, some years previously, Mr. Richard Beck published in the *Transactions* of the Microscopical Society of London (p. 47, 1861) a paper "On the Metamorphosis of a Coccus upon Oranges." This is an interesting account of the development of a scale upon imported oranges, illustrated with a very fine plate of the Purple Scale; but he gave no name to his Coccid. In 1869 Edward Newman published a paper in his journal (*Newman's Entomologist*, vol. iv, p. 217), "*Coccus beckii*, a new British Hemipteron of the Family Coccidæ," in which he says, "I name this scale after Mr. R. Beck, who figured and described, but did not name it." The following is Newman's description: "It appears as a narrow scale about $\frac{1}{10}$ of an inch in length, slightly bent at one extremity, and always adhering so closely to the rind of the apple that it is scarcely possible to remove it entire." As the Purple Scale is not an apple scale, while the Apple Mussel Scale (*Mytilaspis pomorum*) is common in England on the apple, Newman evidently had Beck's plate of his Coccid, but described the Mussel Scale of the apple, of which his named *Coccus beckii* must be a synonym.

Comstock has given his reason for defining the two species *Mytilaspis gloveri* and *M. citricola* in his able report. (U.S. Dep. Agri., 1880.)

1377. *Lepidosaphes beckii*. Cat. Coccidæ, p. 305.

Mytilaspis convexa, Maskell.

Trans. New Zealand Institute, vol. xxix, p. 304, pl. xix, fig. 4. 1897.

This species was found upon the foliage of an *Acacia* in the neighbourhood of Sydney, N.S.W.

Maskell says: "Female puparium dirty greyish white, somewhat expanded posteriorly, very convex; the second pellicle is generally so much raised that its posterior edge forms quite a ridge over the secreted portion. Length, $\frac{1}{23}$ inch."

Adult female brown, abdomen with two broadly rounded median lobes, with the posterior margins finely serrate; margin of abdomen finely serrate. No spinnerets and not many dorsal orifices.

1383. *Lepidosaphes convexa.* Cat. Coccidæ, p. 307.

Mytilaspis cortrioides, n.sp.

The type specimens were found upon the foliage of *Acacia decurrens* (the Black Wattle) growing at Mittagong, N.S.W.

Female puparium forming parallel ridges along the sides of the small branches. Light reddish brown, straight, rather short, somewhat flattened along the dorsal surface. Pellicles pale yellow, shield-shaped. Length, $\frac{1}{20}$ inch.

Adult female dull yellow, irregularly oval, tip of abdomen rounded, with two large, irregularly rounded lobes projecting beyond the margin, widely separated from each other, and somewhat serrate on the extremities; impressed spots behind each, and the margins of the abdomen serrate, with two angular points near the terminal lobes and a third further away. Pygidium thick and opaque.

Mytilaspis crassa, n.sp.

This scale was found scattered all over the foliage of a Ti-tree (*Melaleuca sp.*) at Bowral, N.S.W.

Female puparium snow white, pellicle dull yellow, peg-shaped, carinated, fitting closely into the base of the scale, clothed with white secretion. The scale very convex, narrowed into a neck behind the first pellicle, the second pellicle covered with white secretion forming the neck, swelling out, short and broadly rounded.

Adult female light yellow, cephalic portion narrow rounded, rest oval, pygidium chitonous, outer margin showing no distinct lobes, but indented round the edges in a crenulated pattern; the whole very finely striated.

Mytilaspis defecta, Maskell.

Trans. New Zealand Institute, vol. xxix, p. 304, pl. xix, fig. 4. 1897.

The type of this species was obtained at the Darling Ranges, West Australia, on the foliage of an unknown plant.

Female puparium snow white, pyriform, pellicles yellow, texture soft. Length, $\frac{1}{23}$ inch.

Adult female yellowish brown, of normal form, with the abdomen without any lobes; margin entire, but the median portion slightly produced; five groups of spinnerets; shallow tubercular swellings in the margins of the anterior segments.

Maskell described another lot of specimens which were collected at Geraldton, W.A., on a species of *Hakea* which he called *var. tincta.* The only differences are that the puparium is tinged with greyish yellow, and is more solid in texture, the submarginal pores smaller, and the tubercules less distinct in the female.

1387. *Lepidosaphes defecta.* Cat. Coccidæ, p. 308.

Mytilaspis eucalypti, n.sp. (Pl. IV, fig. 5.)

Specimens obtained on the bark of the small branches of *Eucalyptus piperita*, Mittagong, N.S.W.

Female puparium light chocolate brown, closely resembling the colour of the bark, general form long slender convex, but somewhat flattened on the apical margins. Pellicles light reddish brown, length 3 mm. Male puparium about half the size of female, broadest at apex, which is sometimes whitish; pellicle shield-shaped, carinated.

Adult female slender, of uniform width to the rounded tip of abdomen, latter with two terminal lobes of medium size, close together at the base, the outer margins of the abdomen finely striated.

Mytilaspis flava, Targioni-Tozzetti.

Catalogue p. 44, 1869.

Doubtfully given from Australia in Mrs. Fernald's catalogue.

(To be continued.)

Olearia elliptica DC.—A Native Daisy.

An Armidale correspondent in sending a specimen of this plant, which is a small shrub, says that "it is becoming a pest in some parts, a few miles from Bundarra. It is known locally as 'Peach' and 'Verbena.' It has shallow roots, and is not difficult to pull up in wet weather, but, they say, after pulling a quantity the hands are stained and smell like tar. Also, if bees make use of the flowers, the honey tastes of tar and is spoilt."

It is not stated that this plant is a skin irritant, but two closely allied species, viz., *Olearia viscidula* Benth., and *O. decurrens* Benth., have been dealt with in the *Gazette* for October, 1913, p. 911, and May, 1914, p. 416, and it is very necessary that the fullest inquiries should be made in regard to the injurious properties in any of our native daisy bushes.—J. H. Maiden.

On some Plants which cause Inflammation or Irritation of the Skin.

J. H. MAIDEN,
Government Botanist of New South Wales, and Director of the Botanic Gardens, Sydney.

(Previous references: *Agricultural Gazette*, February and December, 1909; December, 1911; July, 1912; October, 1913; March, 1914.)

The matter of plants which cause inflammation or irritation of the skin is of interest directly or indirectly to every citizen, and as there is such general ignorance on the subject I have for some time past, through the medium of this *Gazette*, been endeavouring to get as much information together as possible.

One of the worst of all plant-irritants is *Rhus radicans* (*R. toxicodendron*), the Poison Ivy, and in the *Gazette* for February, 1909, page 111, in giving an account of my own painful experience with this plant, I stated that I did not believe I touched the plant. Indeed, I have always told people who have come to me for information on the subject, that I did not touch the p'ant, although I was a few inches from it.

It seems a remarkable thing that you can receive injury from a plant without touching it, and I desire to emphasise this point.

The following is an extract from an article on the subject by Professor C. E. Bessey in the *American Journal of Pharmacy* for March, 1914, page 113:—

An assistant brought into my laboratory a tin box full of plants, among which were many flowering specimens of the Poison Ivy. The day was hot, and the assistant had walked in the sun for a mile or more in bringing in the plants. Knowing my susceptibility to Poison Ivy poisoning he warned me not to touch the tin box or its contents. I, therefore, told him to open the box while I looked on and selected the plants which I wished him to preserve for pressing. As the box was opened I leaned over and looked in, being very careful not to come into contact with the box or the plants. As the assistant took up plant after plant I pointed to others, and asked him in regard to the stations where he secured them. I was very careful, as I had been very severely poisoned many times before, and did not wish to have another experience of the discomfort. Yet in a day or two I found myself suffering with the usual inflammation, only the surfaces affected were those only which had been directly exposed when I leaned over the box of plants. My face was inflamed all over, except where my beard, moustache, eyebrows, and nose made projecting protections. Above these there were small areas entirely free from inflammation. The under side of my eyebrows (the "overhang") was thoroughly poisoned, and so was the inside of my nose (the nostrils). My right hand was severely poisoned, but here again the distribution of the inflammation was peculiar, being confined to the parts which were *directed downward* as I pointed at

the various specimens in the box. Thus the proximal and middle joints of the second, third, and fourth fingers, and the under side of the wrist of that hand were badly affected, while the upper side of the hand was not poisoned at all. My left hand was not poisoned, and I account for this by the fact that it was kept back and not used in indicating plants to be examined by the assistant.

I do not see how anyone can escape from the conclusion that that which poisoned me so severely and so peculiarly was volatile enough to be carried up (apparently in straight lines) in the warm air which escapes from the tin collecting box (vasculum) when opened in my study. In this case there was no contact on my part with the Poison Ivy, nor with any other plants in the vasculum. I had been poisoned too often to be careless when warned by my assistant. I am not denying the truth of Dr. Pfaff's conclusion that there is a non-volatile poisonous oil in the Poison Ivy. I am forced to conclude that there is a volatile poison, also, in this plant.

These facts detailed, although published in the Annual Report of the Nebraska State Board of Agriculture for 1901, are new to me.

The plant is so dangerous that I have been instrumental in destroying every one that I could hear of, with the exception of the single one in the Botanic Gardens, which is in a safe place as far as visitors are concerned.

If any of my readers should know of any other plants, I strongly advise them to take steps for their destruction.

Dioscorea transversa R.Br., A Yam, Native of New South Wales and Queensland.

Many years ago, in sending me a sample of excellent arrowroot prepared by a white man from this yam, Mr. Forester Pope, then of the Tweed River, reported that, during the washing of the pulp, an acute irritation was felt in those parts of the hands and arms which came into contact with it.

I do not remember an irritation in connection with yams before, and the matter is worthy of note.

If my readers will turn to my second article on some plants which cause inflammation or irritation of the skin in the *Gazette* for December, 1909, they will see that I give references to irritation in dealing with Hyacinth bulbs and the corms of the common Arum Lily of Sydney gardens. The cause there is attributed to minute needle-shaped crystals of oxalate of lime, and it may be (I simply throw out the suggestion) that a similar explanation may account for the deleteriousness of the yam in the case just referred to.

Official Milk and Butter Records.

M. A. O'CALLAGHAN.

QUITE a large number of cows have just finished their nine months' season under the testing scheme of the United Pure Breeders' Association, and the records given will prove of considerable interest to breeders of Shorthorns, Jerseys, and Guernseys.

From a Shorthorn point of view, the record of the Scottish-Australian Investment Co.'s heifer Melba VII proves the most interesting. This beast was only a two year-old when she began the test, and she has put up a record of 8,077 lb. of milk, testing equal to 412 lb. of butter for the nine months. Another feature of importance is the record of the old Shorthorn cow Madam, the dam of the Champion bull Emblem. She was sixteen years old at the date of beginning the test, and she has shown 7,763 lb. of milk, testing equal to 350 lb. of butter for 273 days. It is impossible to conceive the value of the official test of this cow to the Darbalara Estate, as it shows from what a great milking strain Emblem comes, and it also shows the constitution and longevity which he has derived from his dam.

To Jersey breeders, the record of Mr. Hordern's old Champion cow, Leda's Snowdrop (imp.), is probably the feature of the season. For a cow that was $10\frac{1}{2}$ years old at the beginning of the test to give 635 lb. of butter in the 273 days, even bearing in mind the fact that she did not go in calf until 5th February, 1914, nearly six months after the commencement of her period, the record is, according to Australian figures, a remarkable one.

To Guernsey fanciers, the record of Messrs. Kinross Bros.' cow Merton Margaret II (imp.), is very interesting, more especially so as it was put up in an extremely bad season on the South Coast. In producing 569 lb. of butter in the 273 days, this cow has put up the best authentic record so far for a pure-bred Guernsey in Australia.

RECORDS of Mr. Samuel Hordern's Herd at Bowral.

Name of Cow, and Herd Book Number.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter	Yield on last day of Test.	
					Milk	Butter.
	Years.		lb.	lb.	lb.	lb.
Leda's Picture, No. 1,538	$3\frac{3}{4}$	25 July, 1913 ..	5,974	433	17·50	1·53
Bessie Black III ...	10	31 ,, ,, ...	3,689	222	7·75	·50
Maraposa Lass (imp.)...	$5\frac{1}{2}$	3 Aug. ,, ...	6,038	388	19·00	1·22
Fawn VI	$5\frac{1}{2}$	5 ,, ,, ..	4,092	298	7·75	·85
Leda's Snowdrop (imp.), No. 1,539	$10\frac{1}{2}$	12 ,, ,, ..	9,755	635	26·75	1·81
Katrina IV	6	14 ,, ,, ...	4,536	290	11·50	·87

RECORDS of the Scottish-Australian Investment Co.'s Herd at Gundagai.

Name of Cow, and Herd Book Number.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of Test.	
					Milk.	Butter.
	Years.		lb.	lb.	lb.	lb.
Melba VII	2	7 July, 1913 ...	8,077	412	18·00	·91
Lottie	2	27 Feb. ,, ...	5,827	275	13·75	·71
Siren, No. 686	11	5 May ,, ..	7,651	400	13·75	·86
Bessie II, No. 817 ..	9	5 July ,, ..	9,663	474	16·50	·96
Caroline III	2	22 ,, ,, ...	5,040	229	2·00	·11
Tottie, No. 743	11	13 Aug. ,, ...	7,567	307	16·50	·70
Pride, No. 566	11	27 ,, ,, ...	7,090	322	5·50	·28
Mollie, No. 1,597 ..	9	28 ,, ,, ...	7,039	337	16·00	·90
Sweet Nell III	3	19 ,, ,, ..	5,215	259	16·50	·79
Rapture II	2	14 ,, ,, .	7,015	341	22·50	1·16
Counie IV	3	28 ,, ,, ...	6,505	295	21·00	·91
Daisy VII	3	30 ,, ,, .	6,521	291	18·00	·74
Maggie II	3	12 ,, ,, ..	5,725	272	18·00	·96
Fancy II, No. 928 ...	6	4 Sept. ,, ...	7,208	319	8·50	·41
Madame, No. 406 ..	16	12 ,, ,, ...	7,763	350	19·50	·90
Rose III, No. 1,703 ..	4	8 ,, ,, ...	4,928	254	9·00	·45

RECORDS of Mr. A. L. Manning's Herd at Bega.

Name of Cow, and Herd Book Number.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of Test.	
					Milk.	Butter.
	Years.		lb.	lb.	lb.	lb
Majesty's Starbright, No. 1,185	$2\frac{3}{4}$	9 May, 1913 ..	4,288	267	14·50	1·08
Mary, No. 1,202 .	6 y. 7 m.	13 ,, ,, ...	4,266	274	12·50	·87
Melodrama, No. 1,215..	4 y. 5 m.	24 ,, ,, .	4,145	259	5·50	·42
Judith, No. 1,102 ...	4	25 ,, ,, ..	4,525	302	6·00	·43
Guitar, No. 1,032 ...	$3\frac{3}{4}$	27 ,, ,, ...	4,507	268	8·00	·58
Intrigue, No. 1,079 ...	$4\frac{1}{2}$	30 June ,,	3,892	275	8·00	·55
Mermaid, No 581 ...	$6\frac{3}{4}$	23 ,, ,, ..	4,974	282	10·00	·58
Milkmaid 35th, No. 591	$7\frac{3}{4}$	3 ,, ,, ..	5,992	329	15·00	·86

RECORDS of Mr. James Rixon's Herd at Binna Burra.

Name of Cow.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of Test.	
					Milk.	Butter.
	Years.		lb.	lb.	lb.	lb.
Garnet	7	18 June, 1913 ..	5,172	301	14·00	1·17
Lilymount	8	25 July ,, ...	5,297	293	18·00	1·30

RECORDS of Messrs. Kinross Bros.' Herd at Jamberoo.

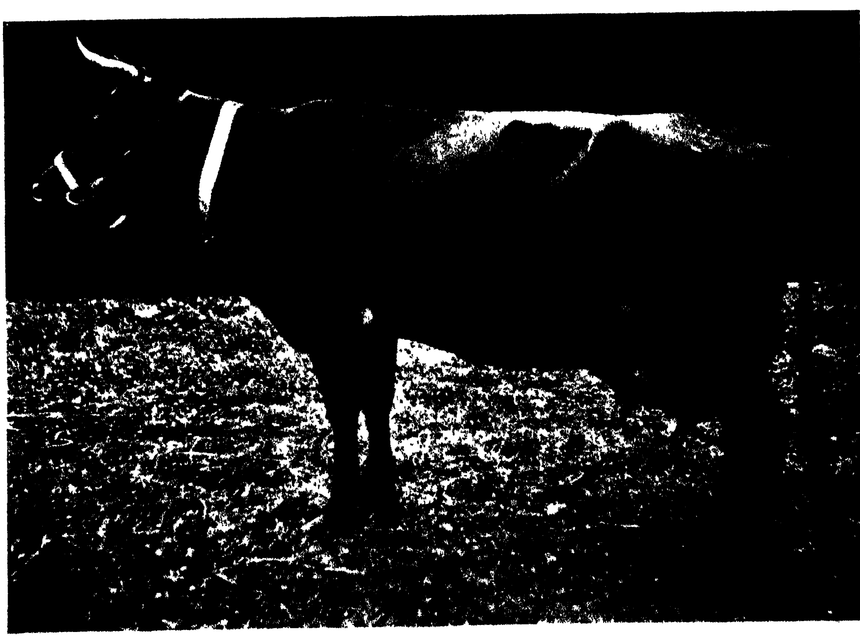
Name of Cow.	Age at beginning of Test.	Date of last Calving.	Total Milk.	Total Butter.	Yield on last day of Test.	
					Milk.	Butter.
	Years.		lb.	lb.	lb.	lb.
Merton Margaret II (imp.)	7 y. 8 m.	24 Sept., 1913...	8,626	569	24·75	1·89
*Rose Pearl	3 years.	30 May ,, ...	5,211	244	9·75	·58

* 243 days only.

Shorthorn Cow, Madame, No. 403, M.S.H.B.

Dam of the original Melba and of the champion bull, Emblem of Darbalara, also grand-dam of the heifer Melba VII, referred to in the text.

Sixteen years old. Yielded 7,763 lb. milk, producing 350 lb. butter in 273 days. The property of the Scottish Australian Investment Co., Limited, Darbalara, Gundagai.



A good type of Dairy Cow.

Molly, the property of Mr. W. H. Dudgeon, Byron Bay, which produced 9,045 lb. milk, yielding 505·8 lb. butter in seven months.

The Value of Herd-testing.

RECOGNITION BY THE TWEED RIVER AGRICULTURAL SOCIETY.

[Continued from page 501.]

II.

L. T. MACINNES, Dairy Instructor.

The Second Prize.

MR. W. H. DUDGEON's cows gained this honoured place, being close up behind Mr. Young's winners. This made the division of the first two places a kind of family affair, for while the owners are closely related the herds themselves are practically first cousins to each other. The average difference between the two lots was very small—3·8 lb. of butter per cow over a six months' period. Considering that Mr. Dudgeon's average was from 118 cows as against his successful rival's 52, the honours can be said to rest easy. Only half a mile separates the two properties from each other, and both are well improved, well grassed, and well watered with creeks.

Mr. Dudgeon's holding runs into 366 acres, made up of two adjoining farms. Of this area 50 acres are cultivated to grow green fodder for the stock to carry them over the winter and spring. The experience of late years has shown that the word "spring" is a misnomer in these districts, in so far as it refers to vigorous growth of pastures during the months of September and October. Hand-feeding has had to be resorted to up to, and sometimes after, that date; in fact, last season there was no real growth in the paspalum areas until March this year. The summer just passed is looked on as the driest remembered—the worst since dairying became established on these rivers. Many were the envious glances cast on Mr. Dudgeon's paddocks of oats, broadcast corn, planter, black Italian rye, and cow cane, and many a sore-pressed farmer, when he looked at his own bare paddocks and low factory returns, resolved never to let another dry spring and summer catch him napping.

It is to be hoped the lesson will not be forgotten. The prolific North Coast produces a tendency to trust too much to nature. When the dry season pinches him the farmer resolves to alter his ways, but when the rain comes, and the paddocks are knee-deep in green grass he is prone to forget. Anyway, after last summer's scorching, if any dairyman wilfully neglects to grow plenty of green crops as an insurance against times of scarcity, he deserves all he gets.

Relying on unaided Nature does not draw big cheques. He is a wise man who always holds in reserve a score or so of acres of broadcast corn and other green feed.

Not only does Mr. Dudgeon show his good judgment and common-sense in this way. He also recognises the fact that to get the maximum grazing capacity out of his farm he must have small paddocks and many of them. Changing the cows frequently from one enclosure to another, means fresher grass for them to eat and more of it, for it stands to reason that spelling the paddocks in rotation is giving the paspalum a chance to thrive.

Three hundred and sixty-six acres, divided up into no less than sixty paddocks of varying areas, the largest being only 20 acres, is what this farmer believes in and what he has put into practice at "Glenthorne," on the outskirts of Bangalow. The accuracy of his conclusion is proved by the big yields and the sleek, well-conditioned appearance of his dairy stock.

As a result of such good farming Mr. Dudgeon's 366 acres carried through last year's droughty times 242 head of stock, without counting young calves not eating grass.

120 milch cows.
100 heifers, from three months.
14 horses.
8 bullocks.

Grazing stock is one thing, grazing them to profit is another

The gross returns from this farm for the twelve months period ending 31st December, 1913, totalled £1,683 1s. 2d., or, say, £4 12s. per acre.

The farm, as a whole, is of good quality, but 120 acres leased at the back are somewhat inferior to the 246 acres owned by the family.

For this leasehold area 25s. an acre is paid annually. The other portion, if leased, would probably bring from 30s. to 35s. an acre, which indicates the difference in quality between the two areas.

On this farm the rearing of young dairy stock takes precedence over pigs, though a goodly cheque is received from the North Coast Co-operative Company's bacon factory too.

Pigs brought in last year £172 7s. 5d, while the sales of young dairy stock amounted to £511 9s.

Cream produced 26,997 lb. of butter, for which £1,096 4s. 9d. was received. This gives an average butter yield of 225 lb., of a value of £9 2s., per cow milked.

As the skim milk was used in feeding calves and pigs, and the former also received a quantity of whole milk during the early stages of their existence, it is hard to obtain the exact income derived from each milking cow.

Calculating the rental expenditure at £519 per annum, being 246 acres at 30s. and 120 acres at 25s., and adding to this the cost in labour, about £460 a year, we have the sum of £979 to deduct from the gross income of £1,683 1s. 2d., which leaves £706 1s. 2d. as the owner's share, from which he has to make an allowance for the amount of capital invested and for depreciation of plant, insurances, federal and shire taxes, and his own remuneration This return was made during the worst season experienced on

these rivers since dairying became the chief, one might almost say the sole, industry of its farmers. The effects of these adverse conditions were in part counteracted by good farming methods and by the owner's foresight in growing plenty of fodder crops to assist the paspalum pastures. Under better climatic conditions there can be no doubt that the returns would have been greatly increased. It must be borne in mind, however, that this is a picked farm—nearly every acre ploughable and the herd is one of the best in New South Wales. These two things cannot be lost sight of when making comparisons with other farms and herds. Taking these two advantages, which the farmer we have under review has, they probably more than counterbalance the disadvantage of the bad season experienced. Therefore, I consider we can be on safe grounds in stating that the returns from the average North Coast farm and herd, in a good season, would be lower per cow and per acre than Mr. Dudgeon's has been for the year 1913. It has been seen that the butter produced in that period by the herd under discussion averaged in value about £9 2s. per cow. Judging by the test record seen, the average output per cow, over the same period, of the whole Richmond-Tweed area would be from 30s. to £2 per head lower than this.

Now, is dairy-farming profitable for the vast majority under existing circumstances? The only salvation seems to be: more science applied to dairying, more method and better business management in the shape of systematic herd-testing. The productiveness of each cow must be enormously increased. That is what the Herd-testing Association stands for.

The Herd.

At the head of the Glenthorne herd is the milking Shorthorn bull, Captain of Glenthorne, No. 156, Vol. iii, M.S.H.B. of New South Wales, bred by the owner. Captain of Glenthorne is by Vain Captain (imp.) out of Daisy II, a cow bred by Mr. Dudgeon and entered No. 137, Vol. i, M.S.H.B. of New South Wales. Pror to this an Illawarra milking Shorthorn, Kelso, bred by Mr. Dixon Cooke, of Alstonville, New South Wales, was used, and a good many of his stock were milked last year.

At the present time, besides Captain of Glenthorne, already mentioned, there is at stud duty Young Kelso, son of Kelso out of Doris, No. 893, Vol. ii, M.S.H.B. of New South Wales, and Young Larry, by Larry from Plum, a daughter of Jennie, the mother of Mr. J. T. Young's Reform.

It is the owner's aim to breed up a high-class, pure-bred milking Shorthorn herd. Already many of his cows, young heifers, and bulls, are entered in the Herd Book.

After two generations of careful selection, this herd comprises many high-yielding cows, but the owner is still not satisfied. He hopes to have, by the aid of the Herd-testing Association to which he belongs, the average yield of his herd up to that of the best cow milking on his farm to-day.

In Molly (Byron Bay Herd-testing Association, No. 99) he has something out of the ordinary. Calving on 9th June, 1913, and tested first in July, she yielded, up to 28th February, 1914, 10,050 lb. of milk, containing

563·4 lb. of butter. On 12th January of this year she slipped her calf, but prior to this accident she yielded 9,045 lb. milk and 505·8 lb. of butter in seven months, as follows:—

Month.	Milk, lb.	Butter, lb.
July	1,485 ...	81·6
August...	1,500 ...	79·5
September	1,350 ...	75.9
October...	1,350 ...	77·4
November	1,200 ...	62·1
December	1,065 ...	62·4
January	1,095 ...	66·9
	9,045	505·8

Not only is she a high yielder herself, but her daughters show themselves worthy of a good mother. One of them, Maiden, 5 years of age, calved 23rd August, 1913. Tested from September, 1913, to May, 1914, in 270 days she gave 6,060 lb. milk and 338·7 lb. butter, and at the ninth test, taken 9th May, her record was 18½ lb. milk, yielding 1·13 lb. butter, for twenty-four hours.

Another cow, Lovely, 4 years of age, calved for the second time on 27th March, 1913. After being fourteen months in milk, the last testing took place on 9th May, when she gave 19½ lb. milk, yielding 1·15 lb. butter. For the whole period of 420 days she gave 13,440 lb. milk and 670·5 lb. butter.

During the first testing year of the Byron Bay Association, which ended 28th February, this cow gave, from 1st April, 1913—eleven months—11,340 lb. milk and 558 lb. butter.

It will be seen that Mr. Dudgeon has set himself a task in aiming to have the average of his future herd equal to the yields of his best cows, as shown by last year's records. After getting his initial records, he took the first steps towards bringing this about by culling twenty-three cows, all low producers, and sending them either to the butcher or boiling-down works. Their places are being taken by the heifers of his best cows.

When asked, Mr. Dudgeon emphatically expressed his opinion of the value of herd-testing. "I consider," he said, "we farmers, dairying in the Big Scrub, were foolish not to take to testing ten years ago. I don't know what we could have been thinking of. We are better educated to-day, thanks to the Department of Agriculture. Look what we would have been in pocket if we only had had such information years ago! The amount is hard to realise.

"Judging by what I have gained only from one year's testing, I can get a dim idea of what has been missed. If my father and I from the start could only have had the advantages now available in herd-testing, we would have by now built up a herd hard to beat.

"Testing, as carried out by the associations organised by the Department of Agriculture, is of the greatest assistance to me as a dairy-farmer, and my employees take a greater interest in their work. They watch each cow's

record every month almost as keenly as I do myself. Naturally, the cows gain by this interest in their performances. They are treated with more consideration and respond accordingly.

"I hope never to have to revert to the old methods of unsystematic testing. Formerly I did some testing myself, but it was never done regularly, and so was of little benefit. Herd-testing as now carried out on the Tweed and Richmond is the best thing any dairyman could take up.

"Its development is of more importance than anything I know of at the present time, and it will be a good day for the Australian dairying interests when every cow in the milking-yards is regularly tested. I sat up a bit myself when I found there were twenty-three wasters to cull out this year, but it has done my herd good, and I can recommend a similar shock to all those who want to make their living from milking cows."

These are the views of one of the foremost dairymen in New South Wales, and they should have due weight with those farmers who are not yet convinced, to the acting point, of the benefits to be derived from testing.

The Breeding of Guinea Fowls.

A correspondent recently asked for information regarding the breeding of guinea fowls, especially as regards the proportions of the sexes necessary, and whether the birds are likely to thrive in thick scrub, or prefer cleared paddocks.

In reply, the Poultry Expert stated that unless guinea fowls have been reared like chickens, with the ordinary domestic hen, about a residence, they will become wild and unapproachable if run in a scrub. The chickens are small and delicate, and dampness is undesirable for them. The adult birds are quite hardy, and do well in scrub country, but it is desirable that a cleared portion of land should be provided, upon which the fowls can be fed; by this means one is able to keep them under control, and make them less shy, as they become used to the attendant.

Shelter sheds should be provided where the birds can roost during unfavourable weather; even in normal weather they will seek such shelter, and they will sometimes take to laying there if the nests are nicely secluded; it is an advantage, also, inasmuch as the eggs can be easily secured.

In a wild state, the birds in question are monogamous, just as pigeons are when domesticated two hens might be allowed to each male. It might be added that sometimes a greater number of hens than this is allowed each cock bird, with success.

The Preparation of Lime-Sulphur Solution.

RECOMMENDATIONS BY THE SUB-COMMITTEE ON FRUIT CULTURE.

UP to the present time many and various formulæ have been proposed both here and in the United States for the preparation of lime-sulphur solutions.

The composition and manufacture of the most frequently used of these lime-sulphur sprays have been the subject of a careful and critical examination by Mr. A. A. Ramsay, of the Chemist's Branch, Department of Agriculture, and, as the result, definite conclusions have been drawn.

These conclusions are summarised below, and, to secure uniformity and to avoid confusion, growers are strongly recommended to adopt the proportions and method of manufacture set forth for the preparation of lime-sulphur solution, the beneficial effects of which, as a fungicide and insecticide, are becoming every year more fully recognised.

Briefly, the proportions of lime, sulphur, and water which give the best results are 50 parts pure lime, 100 parts pure sulphur, and 500 parts of water; all by weight. Commercial sulphur is generally fairly pure, but this cannot be said of commercial lime. Building lime may be taken to contain 95 or 96 per cent. of pure lime; 53 lb. of this lime would, therefore, contain 50 lb. pure lime.

For practical purposes, then, the following amounts should be taken:—

53 lb. freshly burnt quicklime,
100 lb. flowers of sulphur,
50 gallons (*i.e.*, 500 lb.) of water,

in order to make 50 gallons of spray fluid. Smaller quantities than this may be made, but these proportions must be observed. For example, if 5 gallons of concentrated spray fluid are to be made, the amounts to be used will be 5·3 lb. lime, 10 lb. sulphur, and 5 gallons water.

Boiling should be carried out in an iron boiler of sufficient capacity. The most suitable size of boiler will have to be determined by the fruit-grower according to the quantity proposed to be made. To allow for frothing during making, and in order that the mixture may not boil over and thus be lost, it is recommended that the volume of the boiled mixture should not exceed three-fourths of the total volume of the boiler used. Thus, if 10 gallons of spray fluid are to be made, a boiler of at least 14 gallons capacity should be used; 25 gallons of spray fluid require a boiler of 33 gallons capacity; and if 50 gallons spray fluid, then a boiler of 67 gallons capacity is necessary.

Having decided on the capacity of the boiler, a mark must now be placed on the side of the boiler which will indicate the height to which the cold water used will rise when it is boiled in the containing vessel.

Since the measurement of the water is made while it is cold, and the measurement of the lime-sulphur solution is made at the boiling point, a correction must be made to allow for the expansion of the water.

One gallon of spray fluid measured cold will occupy a volume of 1·05 gallons at the boiling point, therefore the number of gallons to be made, measured cold, must be multiplied by 1·05 to give the number of gallons if measured at the boiling point. Thus, if it is decided to make 50 gallons spray fluid, this will occupy a volume of 50 x 1·05 = 52·5 gallons if measured at the boiling point. Therefore, measure into the boiler 52½ gallons of cold water and make a mark with white paint or a file on the side of the boiler, outside and inside, at the level of the water. When filled up to this mark with boiling spray fluid there will be 50 gallons if the fluid were allowed to get cold.

The lime and the sulphur having been weighed out and placed in the boiler, half of the total amount of water to be used is added. This mixture is now thoroughly stirred, and mixed well together with a wood stirrer.

When the first portion of the water is poured on the mixed lime and sulphur, there will be a rise of temperature due to the lime slacking, and a certain amount of spurting of the mixture may take place; but when the remainder of the water (*i.e.*, half of the total water to be used) is added later, the temperature of the mixture will be considerably reduced, and no spurting need be feared. Care should, however, be taken by the operator to avoid any splashes reaching the face.

When the mixing has been thoroughly done, the second half of the total amount of water required is added. The mixture is now to be boiled for one hour.

Although sulphur is heavier than water when in the form of flowers of sulphur, a certain amount may float upon the surface. By judicious stirring and mixing, however, this will soon become wetted and incorporated in the mixture.

As already stated, the mixture should be boiled for an hour—that is to say, the mixture must be raised to the boiling point, and kept boiling briskly (not merely simmering) for an hour; the duration of the boiling is to be reckoned from the time the mixture is raised to the boiling point, and not from the time when heat was first applied to the boiler. The frothing will be at its maximum about fifteen minutes after boiling commences, and will decrease from this on to the end of the operation. During the first portion of the time care must be taken with the firing, and the stirrer must be freely used to break the bubbles rising from the surface, and so keep down the froth.

During the time of boiling, a considerable amount of water will be evaporated, and this should be replaced from time to time by the addition of more hot water, so that at the end of the operation very little adjustment should be required.

The foregoing method gives the best results, but the use of a large boiler is desirable. This apparent expense is, in reality, a saving, for, in order to grow clean fruit, frequent application of the spray pump is necessary, and the home-made spray shows a very large saving in cost over the ready prepared article.

Should it be unavoidable, however, to use smaller boilers, a lime-sulphur spray closely approximating in composition, though slightly inferior in strength to the previous spray, may be made by boiling together for an hour, 53 lb. lime, 100 lb. sulphur, and 25 gallons of water, and diluting with an equal volume of water immediately after boiling. Less than 25 gallons of water cannot be used with the quantity of materials mentioned to obtain an economical and efficient spray.

How to Dilute the Spray.

For use, the spray fluid, as made by the method recommended and first described, should be diluted as follows:—

For winter spraying—

1 gallon of the concentrated lime-sulphur spray should be added to 7 gallons of water.

For summer spraying of deciduous trees—

1 gallon of the concentrated lime-sulphur spray should be added to 28 gallons of water.

For citrus trees—

1 gallon of the concentrated lime-sulphur spray should be added to 20 gallons water.

Spray fluid made by the alternative method must be diluted proportionately.

The concentrated lime-sulphur solution should be used shortly after making. It may be stored in drums, but it is liable to deteriorate on keeping for any great length of time, and especially if a large surface is exposed to the air.

Using the proportions given, the estimated cost of the spray, including freight and labour, is about 4d. per gallon, but, of course, labour and freight can only be estimated approximately.

Note on Lime.

It is essential that the lime used should be of the best quality, and freshly burnt. It should be what is known as "quick lime," "stone lime," or "building lime." It should slack readily with water, becoming hot in the process, and crumbling to a fine powder, free from rocks or stones.

Freshly slacked lime can be used provided it really is freshly slacked. Old slacked lime is of no use in the manufacture of lime-sulphur.

If freshly slacked lime is used, 70 lb. must be taken in the place of the 53 lb. stone lime.

Seasonable Work for Poultry-keepers.

JAMES HADLINGTON.

JULY.

THE hatching season will now commence in earnest, and it is advisable to set all the eggs that can possibly be put down, from now on to the end of September, remembering that these are absolutely the best months in the year in which to hatch the layers. This advice has previously been given; but it cannot be too strongly emphasised that success in egg production largely depends upon the ability to hatch in these months. The small poultry-keeper who is depending solely upon hens for hatching will, of course, be handicapped by scarcity of broody hens, which is always a feature of the early setting months. And here again the trouble is partially owing to late hatchings of the previous year's pullets, because the late-hatched chickens, owing to slow development, are longer in coming on to lay, and rarely do so before July. The aged hens are also late in coming on to lay, consequently it is August before they go broody, and thus the trouble is perpetuated from year to year. Early-hatched chickens are the autumn and winter layers of the following year. The necessity for the use of incubators for early hatching is therefore obvious.

Broody Hens.

When it is desired to get as many broody hens as possible, the nests should be made snug and secluded, and the laying hens should be disturbed as little as possible, and one or two dummy eggs should be marked and left in the nests. The object of marking them is so that they are not gathered with the daily collection of eggs. These dummy eggs and the seclusion will induce the hens to stay longer on the nest when there is the least tendency to broodiness, and consequently they go broody sooner than would be the case if the opposite conditions prevailed. When the hen is found to be broody she should not be transferred to a new nest for a couple of days at least, in order to allow her to become thoroughly broody before any transference is made; otherwise but few hens will take to a new nest, especially in cold weather, when broodiness has less hold upon them than in warm weather.

Setting a Hen.

There are many ways of making a nest for setting hens, and a notion prevails that it should be made upon the bare ground, and a hollow scooped out of the earth to form a mould in which to build the nest. Undoubtedly this is a natural way, but it is not always practicable under all conditions, and in any case, is not necessary. Equally good hatches are brought off nests that are raised from the ground altogether, and the notion that the moisture coming up from the soil is necessary to successful hatching, is an exploded idea. The nests can be made, and equally good results obtained,

everything else being equal, by using a box with a bottom in. A very good size for a nest-box is 15 inches long, 12 inches wide, and 5 inches deep. This should be enclosed on three sides and top, and if necessary darkened in front, and set in a small shed, or some such position. Short-cut, pliable straw, or some such material should be well padded into concave shape round the nest, and sufficient material left on the bottom to bed the eggs properly. It is a good plan to sprinkle a little powdered tobacco leaf through the nest, in case of vermin.

Keep the Hens Clean.

The greatest drawback to sitting hens is their liability to vermin. Everyone who has had even a little experience will understand this; but it is but few who realise the source of all the trouble, and take steps to obviate it. One frequently hears complaints of sitting hens becoming badly infested within a week from being set; but when this is the case, the cause is not far to seek. It lies in the fact that the house from which the hen was taken was first infested, and the infection carried to the nest. The moral is, "Keep the poultry-houses free from lice some time before setting hens are required, and much less trouble will be experienced in this respect with the sitting hens." How to do this has already been indicated in these notes; in short, it is the hen-house that is the focus of the whole trouble. Where many hens are required to be set, the nests can be placed around the floor of a shed, if proper supervision can be given them; but a much better plan is to have a small run for each nest, and feed and water provided in each. In this way much less attention will be needed, and better results be obtained than from the above plan, owing to the absence of fighting and changing of nests, with its consequent casualties.

Attending to the Sitters.

The water-vessel should be placed in a convenient spot, and never allowed to become empty. If a hen becomes over-thirsty she will invariably break one or more of her eggs, and attempt to supply the deficiency. Feed should either be placed in quantity before her, or feed supplied at a regular time every day; grain only being used. Regular daily visits should be paid by the attendant to the nests to see if the hens are coming off the nests for feed and water, and other services, after the first forty-eight hours, and if not, they should be gently lifted off the nest and allowed to feed and exercise from ten to twenty minutes in the early stages, and later on thirty to forty minutes will not harm them, but will be beneficial to the eggs. A dust bath of dry earth or ashes, into which a handful of sulphur has been thoroughly mixed, should be provided in the run; but not too much sulphur, or the fumes will be harmful to the embryonic chick. When several hens are set at a time, it is a simple matter to divide the chickens up between a portion of the hens, and re-set the balance for a second term if hens are scarce. Eggs can be started under hens and transferred to an incubator after the first week, if desired. This is an advantage when incubating eggs which are over a week old when set.

Artificial Incubation.

As a general rule my advice to beginners using incubators is to follow, as closely as possible, the manufacturer's instructions for operating the particular machine they are using. However, I might supplement these on some points. The first is in regard to the regulation of the machine to meet extremes of temperature, one way or another, and one point that incubator manufacturers might be more explicit upon, is to how to meet these. I am frequently told by beginners of their getting up at all hours of the night to attend to the incubator. This should be absolutely unnecessary with any standard make of incubator worked under normal conditions, and the whole trouble, in almost every case, is regulation of the machine, or failure to anticipate coming temperatures. Thus, if a cold night follows a hot day, judgment has to be brought to bear upon the adjustment of the machine to meet the lower temperature, and even though the incubator be running the exact temperature required, it should be altered equal to registering another one, two, or three degrees more, according to the intensity of the change expected, if the machine is to be found at the right temperature the next morning. This adjustment is done first by giving a little more light, and secondly, by a turn or two of the thumb-screw, which on most machines regulates the balance; but in no case should the permanent balance of the machine be disturbed. The same also applies to anticipation of a hot day succeeding upon a cold night; the regulation needs altering in the reverse way, and well in advance of expected changes of temperature. Another point is the proper trimming of the lamp. If the wick is allowed to become incrusted or otherwise dirty, imperfect combustion will be obtained, and the lamp will smoke, resulting in the formation of soot, which, if it falls down upon the light, will most likely cause a fire. When all this is properly understood, there should be no necessity to attend to the incubators between turning the eggs at night and early next morning.

Eggs for artificial incubation should be under a week old when set, because it is found that the chances of a successful hatch diminish with the age of the egg. Eggs will invariably hatch fairly well, even up to three weeks old, with hens if care has been taken with them. This can be done by standing them, large end downwards, in bran or sawdust, keeping them out of draughts; or entirely covered up, and turning occasionally after they are a few days old. Eggs kept so long should not be shaken or jarred in any way.

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

Branch.	Honorary Secretary.
Albury	Mr. J. D. Lankester, Albury.
Baan Baa	Mr. P. Gilbert, Baan Baa.
Balldale	Mr. H. Elrington, Balldale.
Bathurst	Mr. J. McIntyre, Orton Park.
Batlow	Mr. A. C. Arnot, Batlow.
Beckom	Mr. S. Stinson, Beckom.
Borambil	Mr. H. A. D. Crossman, "Homewood," Quirindi.
Bungalong	Mr. G. H. Pereira, "Springdale," Cowra Road, *viâ* Cowra.
Canadian	Mr. C. Smith, Canadian Lead.
Cardiff	Mr. F. B. Cherry, Cardiff.
Carlingford	Mr. D. K. Otton, Carlingford.
Cattai	Mr. A. J. McDonald, Cattai, Pitt Town.
Collie	Mr. C. J. Rowcliff.
Coonabarabran	Dr. F. G. Failes, Coonabarabran.
Coradgery	Mr. J. Clatworthy, Beechmore, Millpose, Parkes
Coreen-Burraja	Mr. N. B. Alston, Coreen, *viâ* Corowa.
Courangra	Mr. S. H. Warland, Courangra, *viâ* Brooklyn.
Cowra	Mr. E. P. Todhunter, Cowra.
Crudine	Mr. F. W. Clarke, Crudine.
Cundletown	Mr. S. A. Levick, Roseneath, Cundletown.
Deniliquin	Mr. W. J. Adams, jun., Deniliquin.
Derrain	Mr. A. P. Hunter, Red Bank Creek, Matong.
Dubbo	Mr. T. A. Nicholas, Dubbo.
Dunedoo	Mr. G. E. Alexander, Dunedoo.
Erudgere	Mr. Frank Hughes, Erudgere.
Fairfield West	Mr. J. H Spargo, Hamilton Road, Fairfield.
Fernbrook	Mr. W. Marks, Yarrum Creek, Dorrigo.
Forest Creek	Mr. W. Thompson, Forest Creek, Frogmore.
Garra and Pinecliff	Mr. A. S. Blackwood, "Netherton," Garra, *viâ* Pinecliff
Gerringong	Mr. J. Miller, Gerringong.
Grenfell	Mr. G. Cousins, Grenfell.
Gunning	Mr. E. H. Turner, Gunning.
Henty	Mr. H. W. Smith, Henty.
Hillston	Mr. M. Knechtli, Hillston.
Inverell	Mr. W. A. Kook, Rock Mount, Inverell.
Jerrara	Mr. A. O. Lane, Public School, Mullengrove, Wheeo.
Jindabyne	Mr. Sylvester Kennedy, Jindabyne
Katoomba	Mr. C. Wooller, Oliva Park Farm, Katoomba
Keepit, Manilla	Mr. J. B. Fitzgerald, Keepit, *viâ* Manilla.
Kellyville	Mr. Joseph Nutter, Kellyville.
Kenthurst	Mr. J. R. Jones, Kenthurst.
Leech's Gully	Mr. G. Stead, Leech's Gully.
Leeton	Mr. C. Ledwidge, Farm 442, Leeton.
Little Plain	Mr. F. S. Stening, Little Plain, *viâ* Inverell.
Lower Portland	Mr. W. C. Gambrill, Lower Portland.
Mangrove Mountain	Mr. G. T. Hunt, Mangrove Mountain, *viâ* Gosford.
Martin's Creek	Mr. P. Laney, Martin's Creek, *viâ* Paterson.
Meadow Flat	Mr. F. J. Brown, "The Poplars," Meadow Flat, *viâ* Rydal.
Middle Dural	Mr. A. E. Best, "Elliceleigh," Middle Dural.
Milbrulong	Mr. O. Ludwig, Milbrulong.
Moruya	Mr. P. Flynn, Moruya.
Narellan	Mr. G J. Richardson, Narellan.
Narrandera	Mr. C. F. Pearce, Narrandera.
Nelson's Plains	Mr. V. Schlaadt, Nelson's Plains
New Italy	Mr. F. A. Morandini, New Italy.
Nimbin	Mr. J. H. Hutchinson, Nimbin.
Orangeville	Mr. C. Duck, Orangeville, The Oaks.
Orchard Hills (Penrith)	Mr. H. Basedow, Orchard Hills, *viâ* Penrith
Parkesbourne	Mr. W. H. Weatherstone, Parkesbourne.

Branch.	Honorary Secretary.
Peak Hill	Mr. A. B. Pettigrew, Peak Hill.
Penrose-Kareela	Mr. A. J. Bennett, "Brookvale," Kareela.
Ponto	Mr. A. D. Dunkley, Ponto.
Redbank	Mr. J. J. Cunningham, Redbank, Laggan.
Ringwood	Mr. Wm. Tait, Ringwood.
St. Mary's	Mr. W. Morris, Queen and Victoria Streets, St. Mary's
Sackville	Mr. Arthur Manning, Sackville.
Sherwood	Mr. J. E. Davis, Sherwood.
Stockinbingal	Mr. J. Neville, Stockinbingal.
St. John's Park	Mr. J. C. Scott, St. John's Park.
Tallawang	Mr. G. Lincoln, junior, Tallawang.
Taralga	Mr. Dave Mullaney, Stonequarry, Taralga.
Toronto	Mr. J. G. Desreaux, Esmond, Toronto.
Tumbarumba	Mr. R. Livingstone, Tumbarumba
Upper Belmore River ..	Mr. A. W. Fowler, Upper Belmore River, *viâ* Gladstone, Macleay River.
Uralla	Mr. E. A. Neil, Uralla.
Valla	Mr. A. E. T. Reynolds, Valla, *viâ* Bowraville.
Wagga	Mr. Thos. Fraser, Aberfeldie, Wagga.
Walla Walla	Mr. H. Smith, Walla Walla.
Wallendbeen	Mr. W. J. Cartwright, Wallendbeen.
Walli	Mr. A. V. Bloomfield, Walli.
Wetherill Park	Mr. L. Rainbow, Wetherill Park.
Wollun	Mr. Robert Turner, Wollun.
Wolseley Park	Mr. H. McEachern, Wolseley Park.
Wyan	Mr. C. W. Harper, Myrtle Creek Railway Station.
Wyong	Mr. Edgar J. Johns, Wyong.
Yass	Mr. Cyril Ferris, Yass.

Notice to Honorary Secretaries.

It is important that a record of the meetings of the branches should be inserted in the *Agricultural Gazette*, and honorary secretaries are invited to forward to the Department a short account of the proceedings of each meeting, with a brief summary of any paper which may have been read, and the discussion that followed it, as early as possible after each meeting. Notes for insertion in the *Agricultural Gazette* must reach the Department before the 16th to ensure insertion in the following month's issue.

Insect Pests.—Quite a number of the branches have availed themselves of the Department's offer to supply a set of insects, being the common pests of the district, and the collections are now being cased. The Government Entomologist suggests that as each district has certain pests peculiar to its orchards and gardens, more useful work would be done if the members themselves collected the local pests (orchard, garden, and stock) and sent them to the Department, where they would be arranged, mounted, a descriptive label attached, and returned to the branch. Mr. Froggatt considers that such a collection would have a far greater value, as there would be more interest attached to the specimens when the members knew exactly where the pests came from, and where and how to find them.

Demonstrations in Clearing Land and Subsoiling with Explosives.

Demonstrations in clearing land and subsoiling with explosives will be given by Mr. H. C. Coggins, Assistant Inspector of Agriculture, to branches of the Agricultural Bureau. Branches who wish to take advantage of this offer are requested to make early application to the Department through their honorary secretaries.

Veterinary Lectures.

In connection with the lectures to branches of the Agricultural Bureau, it is herewith pointed out for the information of honorary secretaries that the following is the list of subjects of lectures which can be delivered to them:—

Horses.—(1) Conformation and Unsoundness (with lantern illustrations); (2) Colic and Treatment of Wounds; (3) Strangles, Influenza, and Tetanus.

Cattle.—(1) Tuberculosis (with lantern illustrations); (2) Contagious Abortion and Contagious Mammitis; (3) Ticks, Tick Fever, Tick Infestation and Eradication.

Sheep.—Parasitic Diseases of Sheep.

Pigs.—Diseases of Pigs.

General.—(1) Parturition of Farm Animals (with lantern illustrations); (2) Feeding of Farm Animals and Dietetic Diseases; (3) Sterility: Causes and Treatment in all classes of Stock.

REPORTS AND NOTICES FROM BRANCHES.

Albury.

At the pruning demonstration held at Mr. J. Fleming's orchard on 8th May there was an attendance of about fifty members and ladies, as well as a number of students from the Lavington Public School. The demonstration was a great success.

Batlow.

At the meeting of this branch held on 16th May, Mr. C. Smith read a very interesting paper on "The Soil and its Treatment." During the course of his remarks he dealt fully with the plant foods of the soil, and described how to replenish soils after they have been depleted of the essential foods. He laid special stress upon the necessity of supplying the soil with humus, and pointed out that this could only be done by either ploughing in green crops or using stable manure. Artificial manures contained no humus; therefore, manuring with artificial fertilisers would not keep the soil in a proper state of fertility.

The visit of the Assistant Fruit Expert, Mr. J. G. R. Bryant, on the 4th and 5th May, was greatly appreciated by all members.

Canadian.

At a meeting of this branch held on 9th May, Mr. J. Baldwin read a paper on "Butter-making in the Summer Time," and a discussion also took place on the subject of running stock on cultivation land.

Cardiff.

A public demonstration of winter pruning was given by the Assistant Fruit Expert, Mr. J. G. R. Bryant, on 6th June, at Mr. J. W. Hoskins' orchard.

There was a good attendance, and the instruction given was much appreciated.

Carlingford.

In furnishing the third annual report of this branch the Secretary advises that the following gentlemen have been elected office-bearers for the ensuing year:—Chairman, Mr. John Neil; Vice-Chairmen, Messrs. A. H. Edwards

and C. Thacker; Treasurer, Mr. C. Franks; Hon. Secretary, Mr. D. K. Otton.

The report shows that the work accomplished during the year compared favourably with that of preceding years.

Since the last annual meeting six meetings and two demonstrations have been held, and one meeting lapsed through insufficient attendance. No meetings were called for the months of August and December, owing to it not being generally convenient to members to attend. There was an average attendance of fourteen at the meetings and demonstrations held.

The most important items during the past year were a demonstration in pruning by Mr. J. G. R. Bryant, Assistant Fruit Expert; a lecture by Mr. Max Henry, M.R.C.V.S., on the parturition of farm animals; and a lecture by Mr. Henry Lord, G.T.A.C., on breeding.

Not the least important part of the operations for the year consisted in fostering a movement which has resulted in the formation of a potato club amongst the boys of the local public school on the lines of the corn clubs of America. As a means of training the young idea in the direction of agricultural pursuits, and of accomplishing much useful work of a high educational value, not only to the boys themselves, but also to the district generally, this club gives every promise of a successful career.

Cattai.

On 13th May the Assistant Fruit Expert, Mr. J. G R. Bryant, gave a pruning demonstration at Mr. T. M. Mitchell's orchard. There were about twenty-three members present, and the Secretary reports that the demonstration was very instructive and much appreciated.

Coradgery.

A meeting of this branch was held at Mr. J. Clatworthy's residence, "Beechmore," on the 25th April. There was a good attendance, and an interesting discussion followed the reading of papers on "Fallowing and Harrowing of Young Crops," by Messrs. P. Lorimer, W. L. Brown, and H. N. Marriott. Mr. Brown's paper was as follows:—

Harrowing Growing Crops.

The main object in harrowing growing crops is to prevent evaporation of the moisture in the soil, and it has also a tendency to cause the crop to stool. I harrow nearly every year, my reason being that I usually feed off and the ground gets set with the stock going over it. I am unable to say to what extent it increases the yield as I never kept any record. I use light diamond harrows, sharpened specially for the occasion. A good deal of wheat seems to be pulled up, but not much by the roots, so what is pulled up does not signify. I have no doubt that harrowing is beneficial by the healthy look the crop has a few days after being harrowed. Spring is the time to harrow, especially after rain. Harrowing is practised extensively in the southern districts during September, and we being earlier than there, the latter part of August I think should be the right time here, as the crop should be well rooted then, and the danger of pulling too much up is not great. Crops can be harrowed up to 12 inches high—in fact, some harrow till they are nearly out in ear. Mr. Birks, speaking on dry farming at Coolac, advocates harrowing growing crops two or three times—I presume at different intervals. The drier the season the more beneficial harrowing is. On no account should the ground be harrowed when wet.

Mr. Lorimer's paper was as follows:—

FALLOWING AND ITS EFFECTS.

In modern farming I suppose there is no word or term more used and conversed over than "fallow," and it has become evident and proved that no system of up-to-date farming can be thorough or effective without this method.

Now, I suppose that we all know that the primary and chief object of fallowing is the "conservation of moisture." By that term is meant the conserving, preserving, or retaining of the rain which falls during the late spring and summer months, and which is practically of no use to growing crops if allowed to evaporate before sowing.

One way of conserving this rain would be to store it up in tanks or reservoirs and use it for irrigation; but the more economical means of doing it, and the means at the disposal of every farmer, is the use of the surface mulch to prevent evaporation from the subsoil. There are several mulches, such as straw or stable manure, but the one great mulch obtainable by everyone is the natural soil surface.

The evaporation of the moisture from soil is caused by capillary action, which is the forming of small natural hairlike tubes in the soil wherever it becomes compressed or set; and as the main object of fallowing is to prevent evaporation, it will readily be seen that these capillary tubes must be kept from forming. To do this it is necessary to plough the ground when it is in its best order in the winter, and when there is a good supply of moisture in the subsoil, and then by working the surface soil during the spring and summer months, the formation of capillary tubes is prevented and evaporation minimised.

Every time rain falls it will have a tendency to make the soil compact on the surface, and immediately this happens capillary action starts and causes evaporation; it is necessary, therefore, to get to work to break up the surface and again form a loose surface mulch.

The implements mostly recommended for this purpose are the harrows, spring-tooth cultivator, and disc cultivator; but discretion must be used in selecting these so as not to make the soil too fine. The finer the surface the more readily it runs together and becomes set (especially is this so in our clayey soils), and the subsoil moisture will be lost. Another escape of moisture is caused by the growth of weeds, but effective working will keep these down as well as retain the mulch.

If this is carried out carefully it will be astounding to find the amount of moisture which can be stored during this period for the benefit of the next year's crop. In virgin clay loam soil without any mulch, evaporation goes on at the rate of 21·31 inches of rain per acre per 100 days. With 1 inch mulch 11·13 inches of rain evaporate, in other words 47·7 per cent. of the moisture is saved; with a 4-inch mulch 63 per cent. of the moisture is saved.

Although the fundamental principle of fallowing is the conservation of moisture it has its other advantages as well. The fact of the soil lying exposed and bare to the effects of the atmosphere increases its fertility; as a preventive and cure of "take-all" it is the only means I know of recommended, and it is, or should be, always ready to sow. Without fallow, farmers are continually being held up by dry weather waiting to start ploughing operations to put in their crop; but by fallowing in the previous winter the land can always be well ploughed and loss of time in getting the crop in is averted.

The experiments carried out in our own district last season by the Department of Agriculture at Nelungaloo (vide *Agricultural Gazette*, March, 1914) on fallowed and unfallowed land, all other things being equal, showed the advantage of fallow to the extent of 8¼ bushels. The return over eight plots averaging:—Fallow 20 bushels per acre, unfallowed 11¾ bushels per acre. In my own experience in 1912 the fallow beat the stubble land by an average of a little over two bags per acre.

It is a fairly common practice among some farmers to plough the land for fallow and then leave it right through the months most necessary for effective working. While this is no doubt better than nothing, inasmuch as it makes the land more fit to absorb the moisture and certainly obtains some of the benefits from atmospheric effects, it is not fallow in the true or more scientific meaning of the term.

Yet to follow the working of fallowed land theoretically would, to the average farmer, be impracticable, but with the full advantages in view it should be worked to that aim as near as possible.

The effect of harrowing growing crops is exactly the same as the cultivation of fallow. To run the harrows over a crop after it has well-established itself makes a surface mulch and helps to retain the moisture in case of dry time ensuing. It may be harrowed as often as necessary up to the time it is from 6 to 10 inches high.

In these days of high land values, high wages, dear living, and increased taxation, we must get all the return we can, and to do this it is absolutely necessary to fallow.

Courangra.

At the May meeting a discussion took place on the destructiveness to fruit crops of both the Silver Eye (*Zosterops coerulescens*) and the White-winged Chough (*Corcorax melanorhamphus*), most particularly the latter. It was universally affirmed that their destructiveness was greater than their value locally as insectivorous birds.

Hillston.

At the April meeting of this branch a discussion on "ringing" green timber and using arsenic took place, several members having found difficulty in killing timber that had been "rung" in the ordinary way, owing to the free suckering that followed.

Manures and Manuring.

A paper on this subject was read by Mr. Lapthorne, in which reference was made to the extension of wheat-growing made possible by the use of superphosphate. He could remember when that fertiliser was first introduced some twenty-five years ago into one district in Victoria. Some of the manure then sold was practically useless, owing to faulty treatment and the fertilising agents not being available in an easily soluble form, but the discovery of a chemical process of making the phosphates more easily available and the general increase of knowledge of the subject had altered that. The wheat crop needed a fertiliser that would enable it to make a vigorous growth at the outset, so that it was advisable to get a manure that possessed a large percentage of phosphates in a readily soluble form, and to see that it had a certificate accompanying it guaranteeing its quality.

It was well to remember that it was the crop that had to be manured, not the land, and the fertiliser should therefore be applied with a drill at the time of sowing, so that the manure would come into contact with the seed and young plant at once.

In rich, loamy land, for the first crop he would not advise the use of fertilisers at all. A little, say, about 18 or 20 lb. to the acre, might be used for the second crop, and, with succeeding crops, as the land began to get worn out, the amount should be increased, and in old and worn-out soils from ½ cwt. to 1 cwt. A stiff soil, in which the clay was fairly close to the surface, would stand more manure than a deep, loose loamy soil. In rich, new land there was always a danger of the plant growing flaggy and rank, and burning off, if too much fertiliser was used. In his opinion, a fairly stiff soil, like some of the box country in this neighbourhood, with about 25 to 30 lb. of superphosphate, was the best soil for wheat-growing.

Fertilisers might be expected to give better results in some seasons than others, but judicious applications would always repay the farmer. At the same time, fertilisers could not take the place of good thorough farming and tilling.

In reply to a question, Mr. Lapthorne said he thought 30 lb. to the acre would be a fair quantity of manure to use on loose, sandy soil that had given several crops.

It was decided that some of the meetings of the branch should in future be held at members' residences, in order that they might become acquainted with one another's methods.

Inverell.

About thirty interested persons gathered in the Urabatta paddock, close to the Ross Hill School, on 21st May, to witness a demonstration by Mr. H. C. Coggins, of clearing with explosives.

Clearing with Explosives.

Prior to commencing operations, Mr. Coggins explained that the recent rains would not in any way aid the experiments, as a moist subsoil lessened the resistance, giving the explosive nothing to "kick" off. For best results, the work should always be carried out in dry weather—the drier the better.

Coming to the practical part, the demonstrator selected a green forked box stump about 15 to 18 inches through at the base—the kind of stump the ordinary clearing contractor would call a "tough customer." Three holes, commencing about a foot away from the base and running underneath for about 18 inches, were made with augers, preparatory to inserting the charge. Mr. Coggins explained that the object in putting in the holes was to concentrate right under the tree. Experience alone could tell how much explosive to use—that was largely determined by the nature of the soil and the kind of timber being dealt with. In case of surface-rooted timber, the course was to put a shallow charge underneath the stump and lift it right out.

It was imperative to know something about the explosive proposed to be used before taking up the work. For safety, convenience, and results he preferred gelignite. Dynamite was too dangerous for general use, the difficulty being that if it got moistened at any time, its two component parts—nitro-glycerine and earth—separated, rendering it extremely dangerous to handle. Gelignite, on the other hand, was not affected by moisture. Gelignite in a frozen condition was highly dangerous, and should be thawed by being put into a vessel which in turn was placed in hot water. One did not need to be an expert to take up the work, but he should make himself conversant with the use of explosives before starting.

In all, seventeen plugs of gelignite, with detonators and insulated wire, were placed in the holes. The plugs were first broken and gently compacted in the holes, after which the primer, with detonator, was placed in position and the hole tamped with moist earth. On no account should a metal tamping bar be employed. The wires were then connected so as to form a complete circuit round the stump, when the whole was connected with an electric battery about 100 yards from the spot, the battery being preferred so as to set off all the shots simultaneously. The stump was shattered and blown clean out of the hole.

The demonstrator stated that from seven to ten plugs would have been ample for the work. For the same cost stumps twice as large could be shifted, and one man could do twenty in a day.

A demonstration in subsoiling was given afterwards with success.

Leech's Gully.

The annual meeting of this branch was held on 8th June, when the Treasurer submitted a balance-sheet showing a substantial credit.

The following gentlemen were elected office-bearers for the ensuing year:—Chairman, Mr. A. Mansfield; Vice-Chairman, Mr. J. W. Taylor; Treasurer, Mr. J. Donnelly; Hon. Secretary, Mr. George Stead.

Lower Portland.

At the monthly meeting held on 20th April Mr. R. Lowe, chairman, read the following interesting paper:—

General Agriculture.

In order to keep the land moist and mellow through the summer months when it is required to stand the strain of production, we must prepare it in the proper time in order to allow Jack Frost to do his work. To obtain the best crops of maize, pumpkins, potatoes, melons, or tomatoes it is necessary to

have the land well ploughed not later than the middle of June, being careful that the land is not too wet. This must be determined by the nature of the soil. Plough from 7 to 8 inches deep, turning under all the rubbish possible, and leave it in that state until the spring. Next put the roller over it, and then it is fit for the plough again. It is always better to cross-plough the second time if the paddock is not altogether too short.

Harrow lightly, avoiding as much as possible the taking out of any of the rubbish you have ploughed in.

If sowing maize, drill about 4 inches deep with a double-board drill, or if you have no drill, go twice with the plough. Perhaps this may appear to be a waste of time, but I contend that it is a good crop we are working for, and by turning out each side of the drill we have fine soil to place back against the young plant when it is large enough, and also ensure the smothering of most, if not all, of the weeds that have sprung up in the drills. An immense lot of hoe work is thus saved. This alone will pay for the extra time taken in double drilling. If the scuffle is properly used, nothing further will be required till it is fit for hilling, which should be done when the corn is from 12 to 15 inches high.

If the drills are 4 feet 9 inches apart it will take three furrows after the hill to cut the row out, which should be done neatly and lightly, and not harrowed down. The reason why I favour leaving the furrow intact is because the comb of the furrow holds the water and allows it to soak in near the plant and keeps the land mellow, whereas if the harrow is put through, the soil is evenly sloped to the centre, naturally conveying the water to the centre of the rows, causing the land to go hard. This will be well proved in the next season's ploughing. The above method of cultivation applies also to melons, pumpkins, and tomatoes, the only difference being that the plough must be used more often in the tomatoes, which are like cabbages—the more the soil is moved the better they will grow.

To get a good crop of barley, oats, or wheat for green feed is a very much more difficult job now than it was twenty years ago. I have seen heavy crops of Cape barley on land that had just had a crop of corn taken off, the land being ploughed once and the barley sown without any manure. That would not do now, for little or no crop would be the result. My experience is that for summer crops the land must be well ploughed and left open to the winter frosts, and for winter crops it must be opened up to the summer sun, giving the sun a chance.

Many farmers have different methods of cultivating new land. The method I prefer is to plough very shallow the first time, then roll down the way it was ploughed, and cross-plough. Have the blade of the coulter drawn to a needle point, and set with as much slope as possible, and by ploughing about 2 inches deeper than the first time, you will have very little difficulty in cross-ploughing. You will then have your land cut in small sods. Many farmers harrow a great deal after cross-ploughing, and burn off as much grass as possible, but I prefer to keep it in the sod by moving it with the plough, thus preventing it from being distributed through the soil, for the smallest piece of couch grass will grow.

As this paper is only meant for the inexperienced beginner, a word or two on the team and plough may not be out of place. To keep the horses cool and good-tempered is the first thought of a good ploughman, and to do this they must not be coupled too closely, but allowed sufficient room to walk clear of each other, for if they are too close the heat of each other is nearly as oppressive as the work. A good ploughman will drive his team straight out at the end, stop them, and turn with traces slack. This will prevent chafing by the chain, and one stamping on the foot of its mate, which very often causes "side bone." The plough should be kept in perfect order, and the coulter set perfectly true, and the share gripping slightly, so that the ploughman must keep a little pressure on the handles, keeping the plough slightly on sole plate.

Discussion.—A general discussion followed the reading of the paper, during which Mr. Lowe extended his theory on the various methods of cultivation. Many questions were asked, which were willingly answered by Mr. Lowe.

Mr. R. M. Smith said he did not agree with Mr. Lowe in not using the harrow on new land. He and others had used it that year with very good results.

Mr. LOWE, however, held firmly to his opinions, having proved his methods by experience.

Altogether it was a most valuable and interesting meeting, at the conclusion of which Mr. J. Brown promised to lead a discussion on "Rock-melon Culture" at the next meeting.

A hearty vote of thanks was accorded Mr. Lowe for his paper, and the meeting was declared closed.

On 14th May Mr. J. G. R. Bryant, Assistant Fruit Expert, gave a pruning demonstration in Messrs. J. J. Hirp's and R. Lowe's orchards, a fair number of members of the branch being present.

PRUNING DEMONSTRATION.

The varieties of trees included in the demonstration were pears, apples, quinces, apricots, plums, and peaches. Many questions were asked Mr. Bryant, who expertly handled his trees, showing how to encourage fruit spurs instead of the long soft growth so prevalent in fruit trees. In the plums, which make such heavy growth, he showed the advantage of letting them grow unpruned one year and simply topping the next. This method was demonstrated last year in Mr. Lowe's orchard, and clearly showed an immense saving of labour in pruning and an encouraging development of fruit spurs all along the limbs of the tree. Examples of various grafts were also shown, prominent among which was the strap graft, which, when worked with ordinary care, is almost a certainty.

At the conclusion of the demonstration, Mr. Bryant said that, as he would be in the locality the following night, he would give a demonstration in fumigating citrus trees. This offer was at once accepted. Accordingly there was a good muster of orchardists at Mr. Lowe's orchard, where the demonstration took place, four trees being treated.

Later on the party assembled at the School of Arts, where Mr. Bryant gave an address, expressing his pleasure at finding how well the branch was working, and giving much valuable advice as to how it should be run. He also described the varieties of fruits and pests and treatments for same, and strongly recommended the early varieties of stone fruit for this district.

A friendly chat all round concluded the gathering, which dispersed with the feeling that much had been learnt.

Moruya.

On 21st May, Mr. H. R. Alexander, of the Water Conservation and Irrigation Commission, gave a lantern demonstration and lecture before a good attendance of members. The views were very clear, and a true representation of the actual objects and undertakings of the Yanco Irrigation Area.

Each view was clearly explained, from the beginning of the Burrinjuck dam down to the farm lands, the explanation proving a revelation to many present.

Many questions were answered satisfactorily, and Mr. Alexander strongly advised any men in search of farms to make the trip to Yanco. He stated the Government did not want farmers to abandon their holdings, but it was alive to the fact that many South Coast people were migrating to the North and to Queensland, and he considered Yanco a far better field to exploit, as there was a good future before it, particularly for men of farming experience.

Narrandera.

A lecture was delivered before this branch on the evening of 14th May by Mr. T. Wise, on "Bulk Handling of Wheat." This will be referred to in detail in our next issue.

Nimbin.

At the meeting of this branch, held on 9th May, a discussion on winter fodders took place.

Tartarian oats in this district are generally supposed not to be rust-resistant, whereas the reverse opinion is held regarding Algerian; yet, on the flats last

winter Tartarian yielded three times as much feed with no rust, whilst Algerian was only a few inches high and red with rust.

The Secretary considered that the difference was accounted for by varying conditions of the soil.

Thew wheat and vetches were looking well. Last winter, while Thew and Bobs did fairly well, Huguenot gave most feed.

When the season is favourable, Italian rye grass grows well in the district.

Indian cow-cane is not now looked upon with such favour as it used to be, as the stalks get too hard if left any length of time.

Some of the farmers in the district believe in cutting their green feed, but one of the members of the branch considered that it impoverished the land. He always let his cows eat it off, and thus got the paddock well manured, and from it he got a good crop of maize afterwards.

DEPARTMENTAL NOTE.—Experiments in connection with winter feed, carried out over a number of years, proved distinctly that Huguenot, mixed with either vetches or Canadian field peas, not only gives the most nutritive fodder, but also a larger bulk of fodder than any kind of wheat or oats grown by themselves. Regarding the practice of allowing cattle in to eat the green feed off, no doubt the droppings from the cattle help considerably to enrich the land, but it is a practice which is not advocated, as the cattle tramp down far more than they can possibly eat, and a considerable amount of waste is occasioned.

Orangeville.

The Assistant Fruit Expert, Mr. J. G. R. Bryant, visited this district on 22nd April, and gave a demonstration of pruning, and some advice about spraying and grafting. There was a good attendance of members. Such visits have proved very useful to the fruit-growers in many ways, not the least being acquaintance with different forms of disease that are unknown to the ordinary man.

Mr. J. R. Small gave an address to the members of the branch on 6th May.

BEE-FARMING.

Mr. Small has worked bees as a side-line for at least thirty years, with a large amount of success. Armed with an up-to-date bee-box, frames, &c., to demonstrate upon, he made his address clear, and at the close was accorded a hearty vote of thanks.

Mr. Small favoured the pure-bred Italian as the most profitable breed to keep, being not only a greater honey producer, but quiet to handle. The great trouble was in keeping them pure, the danger being the black bees in the bush.

None other than the patent boxes should be used, and with care they lasted a very long time; some in use by him he had bought second-hand sixteen years ago, and they were still as good as new. The one-pound sections he had discarded altogether; they were nice for home use, but as a payable proposition extracting was the best.

The hives should face the east, with a good shelter from prevailing cold winter winds.

Honey from the thorn flowers was almost useless, on account of its flavour, and it was his custom as far as possible to feed this back to the bees. In this district the best honey came from the box, ironbark, bloodwood, spotted gum and stringybark; corn, he considered, produced no honey. Honey should be well matured and well capped before extracting, so as to secure the necessary flavour and thickness.

Crossbred bees could be bred back to the pure Italian by re-queening, which ensured purity for about two years. The old queen should be killed five days before the new queen arrived, and all the queen cells should be cut out to prevent them raising a new queen of their own.

Queens were received packed in a small box, partly made of wire-gauze. A frame was lifted from the centre of the box, and the tube containing the new

queen was laid underneath. In a few days the queen ate her way out with the assistance of the outside bees, and by that time the swarm had become attached to her, and all was well.

The meat ant was the greatest trouble, as far as ants were concerned, in this district, and these Mr. Small prevents from doing damage by raising the hives well above ground. The moth gave trouble only when the bees were weakened by having passed through a drought.

The best robbing time for this district he considered to be from Christmas to Easter.

Mr. Morrow addressed the members at the June meeting, held at Werombi, on "Book-keeping for Farmers, with relation to the Income-tax." This was a very instructive address, and was much appreciated by the large gathering. Mr. Morrow has promised to continue this address when further information comes to hand.

Parkesbourne.

A paper on the best varieties of fruits to grow in Parkesbourne district for the Sydney market was read at the April meeting of the above branch. The following is the text of the paper:—

Varieties of Fruit for Parkesbourne District.

My purpose in writing this paper is not to give information, for the majority of the members know as much on the subject probably as I do, but it is rather to induce discussion and give members an opportunity to give their experience.

Cherries.—The standard sorts are so well known that little need be said. In this district it is better to grow the early and late kinds than the mid-season varieties. One of the earliest is Early Purple Gean, but with me it is a poor cropper, trees six or seven years old not yet having borne any fruit worth mentioning. One of the best "earlies" is Early Rivers, a good cropper and of good colour. Early Lion is another good sort, rather firmer than Early Rivers, but some of the trees of this variety are very hard to shape, having a great tendency to droop, and to grow eastward away from the westerly winds. The fruit of Early Lion is also very susceptible to adverse weather conditions, in both the green and ripe stage. Another cherry which is much favoured by some growers is Twyford Bigarreau, but it is not a success with me. Of later sorts none are better than Napoleon, Florence, and St. Margaret, the latter being a first-class market sort, but not a reliable bearer. Another kind which can be profitably grown and classed as a mid-season variety is Black Tartarian.

Apricots.—My experience of apricots is very limited, as I have only one good variety growing, that is, I believe, Moorpark, which gives good paying crops every second year.

Plums.—The orchardist who would grow plums successfully must go in for a firm fruit of large size and good colour. Green or yellow varieties, even if of good size, will not bring such good prices as coloured fruit. Early plums are not very profitable on the whole, as they must be sent to market right in the midst of the summer fruit season. Of late sorts, Pond's Seedling, Grand Duke, and President will undoubtedly be the leading varieties. Pond's Seedling is a large red plum which must be picked for market when the first tinge of colour shows, as it does not hang well when once it is fit to pick. It may also be necessary to pick over this variety two or three times. Grand Duke is a very fine purple plum which hangs well after it has coloured. President is a new plum which also hangs well.

Peaches.—These should be profitable in our district, if varieties are grown to ripen at the end of February, March, and April, and if growers will use the lime-sulphur spray to control the "leaf-curl." One good freestone variety ripening at the end of February is Globe, a firm, yellow-fleshed fruit, but the tree takes "leaf-curl" very badly. One of the best with me is Camden Golden, a large fruit ripening in March. Italian varieties also succeed well in this district. A good clingstone peach is Fulton, which is of large size and a good colour.

Pears.—There is no doubt that first place must be given to Williams'. It is so well known that any remarks are unnecessary. Another pear which is worth a place in every orchard is Fertility, for while it will not be so popular as Williams', it can be relied upon to produce a crop every year, and will withstand frost better than any other sort I know. Packham's Triumph should also be a valuable sort, as it ripens near the end of the pear season.

Apples.—There are so many kinds of good apples that it is only possible to mention a few of the leading sorts. In our district it is the early apples that pay. Not only do they bring good prices, but the loss through birds, wind, and codlin moth is not so great as with the later varieties. On the early apples perhaps none are more popular than Gravenstein, known locally as Gloria Mundi, an apple of good appearance and flavour, but unfortunately the trees appear to be short-lived. Another one that succeeds well and is a good market sort is Lady Carrington, coming in before Gravenstein. Of the next to be in season, Jonathan is a good market sort, and so is Pomme de Neige. Both kinds can be relied upon to bring top market price, being of a taking appearance, and we all know that it is the colour that sells the apple. London Pippin (Five Crown) is an old favourite, and it is one of the few among the older sorts that retains its popularity. Another one which is likely to be largely planted is Black Ben Davis, a good clean apple of good size, ready to market in March; the trees are strong growers and easy to prune. Of the late varieties, Rome Beauty and Granny Smith are two excellent varieties and good keepers, the latter apple keeping firm and solid right through the winter. The above are only a few among the many good apples, but they will furnish a succession of good fruit right through the season.

On 28th April Mr. H. O. Oliver, M.R.C.V.S., gave a lantern lecture on conformation and unsoundness in horses, which proved most instructive and interesting to the large number of farmers and orchardists present.

At the May meeting of this branch the following gentlemen were elected office-bearers for the ensuing year:—Chairman, Mr. S. W. McAlister; Vice-Chairmen, Messrs. G. Brown and C. Apps; Treasurer, Mr. J. Brown; Hon. Secretary, Mr. W. H. Weatherstone.

In furnishing the annual report on the operations of the branch, the Secretary stated that it was formed on 21st May, 1913, with an enrolment of nineteen members. Since that date the number has gradually increased until there are now thirty-seven members from the whole of the surrounding district. There have been eleven monthly meetings, most of which have been fairly well attended. A number of papers have been written by members and read at the monthly meetings, all of them proving very instructive and interesting. During the year departmental officers had given veterinary lectures, and a demonstration in pruning and grafting was also given by the Assistant Fruit Expert. Both demonstrations and lectures proved most successful, creating a good deal of interest and attracting excellent attendances.

The report acknowledged that during the year quite a number of valuable hints and instructions had been received from the Department on the subject of insect pests and other troubles in orchards, for which all the members felt grateful.

Ponto.

At the usual monthly meeting of this branch on 8th May there was a good attendance.

Amongst other business, Mr. A. D. Dunkley gave a short explanation of the use of sugar of lead and sulphate of zinc for horses' sore shoulders. He considered that these two ingredients should be mixed at the rate of 1 oz. of each to 1 pint of water, the mixture being shaken well while being used. The best time to use it was while the horse's shoulder was sweated and the sore was moist. A little solution should be sponged on to the sore. Care should be taken to remove the scab from the collar, which had a tendency to irritate the sore. This treatment should be repeated several times

a day. Meanwhile an effort should be made to remove the cause of the trouble, and this might be effected by using only a well-fitting collar on the horse, and adjusting the hames at the bottom, so that the collar was kept narrow and not allowed to spread.

Redbank.

The annual meeting of this branch was held on 6th May, when the Secretary submitted his report on the year's work. He stated that the branch had experienced a successful year.

The following gentlemen were elected office-bearers for the coming year:—Chairman, Mr. J. N. McDonald; Vice-Chairmen, Messrs. S. Cullen, W. Cullen, T. Davy, and J. J. Broderick; Hon. Secretary and Treasurer, Mr. J. J. Cunningham.

Sackville.

At a meeting of the above branch, held on 5th June, a general discussion took place *re* Mr. H. C. Coggins' demonstration of clearing with explosives, all members of the branch agreeing that it was a very cheap and effective mode of clearing.

Taralga.

This branch held its usual monthly meeting on 11th May, when there was a splendid attendance. Members are now realising the great benefits to be derived from the Agricultural Bureau, and there is promise of a busy time during the current year.

Valla.

A new branch has been formed at Valla, *viâ* Bowraville, with a membership of twenty to commence. The subscription has been fixed at 1s. per annum, and regular monthly meetings will be held on the Thursday evening preceding full moon.

Mr. Alfred Martin, J.P., has been elected Chairman, and Mr. A. E. T. Reynolds is the Hon. Secretary.

The first monthly meeting was held on 4th June, when there was a good attendance in spite of threatening weather. Four new members were enrolled.

Members discussed the subject of foot-rot in cattle, which is very prevalent in this district on account of continuous heavy rains.

It was decided that the Secretary should write to the Department of Agriculture asking for a cure.

Walli.

On 5th June Mr. G. A. Meier, Orchardist at Bathurst Experiment Farm, gave a pruning demonstration at Walli before upwards of fifty persons. In addition to explaining the best methods of pruning, Mr. Meier gave some useful hints on grafting, and he also made special reference to the suitability of the soil of the district for pear-growing.

Wyong.

A lecture on "Parturition of Farm Animals" was delivered by Mr. A. E. Massey, M.R.C.V.S., on the evening of 18th May to an audience of forty at Wyong. The next morning he gave a demonstration of the method of castrating a colt.

Orchard Notes.

W. J. ALLEN.

JULY.

Planting.

WHERE orchards are to be planted, the land should be in thorough readiness; apples, pears, &c., should be put in this month, while citrus trees may be planted either at the end of August or early in September. In cold, late districts, only varieties of apples and pears suitable for export should be planted.

When planting, the greatest care should be exercised to see that the roots of the trees have plenty of space; no crowding should be allowed. The roots should be carefully examined and all bruised ones cut away. Care should also be taken not to plant the tree too deeply, as this is very often a cause of failure. The roots should be well spread out and evenly distributed around the hole, it being often a good plan to set the strongest roots in the direction of the prevailing winds, as they then tend to brace the tree.

The right depth at which to plant is as near as possible the same depth as the tree stood in the nursery, and the hole should be so dug that the centre is kept rather higher than the sides to allow the drainage to run from the base of the tree, not towards it.

After the tree has been planted, cutting-back has to be considered. The removal of the tree from the nursery has destroyed the greater portion of the fibrous roots, and in order that the top may correspond with the reduced roots it should be cut well back. This cutting-back at the planting is the first and most important step in the formation of the future tree, and the grower who neglects to do it prevents, in a great measure the vigorous development that takes place when the tree is properly started.

Harvesting Citrus Fruits.

This work is in full swing at the present time. There still exists a lack of attention to grading and packing. To ensure high prices, the fruit should be put up in as attractive a manner as possible. Without thorough attention to grading, good packing cannot be accomplished. The 3–2 and 2–2 diagonal systems of packing answer for the majority of sizes.

Pruning.

The most important work during this month is the pruning, which must now be pushed on as fast as possible, so that it will be completed and the ground well ploughed while it is still moist. Each and every tree has its

own individuality, and therefore the grower should study the habits of the different trees and prune them in such ways as will ensure that they will return him the best fruit from year to year. Weak trees may have their leaders well shortened back. Burn all prunings as soon as possible. The most expeditious way to accomplish this is to mount an old tank on wheels with grating in bottom. (See illustration on page 546 of the June issue.)

Grafting.

Grafting may be done in the spring, just when the buds begin to swell; all cuttings for grafting should be heeled in the ground in a cool place. Be very careful to remove the cuttings from bearing trees, as often there is too much left to chance in the selection of grafting-wood, with the result that grafted trees do not appear as good as the parent. Young wood of the previous season's growth should be selected, about the size of an ordinary lead pencil. The scions should be kept thoroughly dormant.

Fumigation.

A good deal of fumigation work is being carried out for the control of scale on citrus trees. A successful fruit-grower in the Kurrajong district states that he prefers winter fumigation; he then uses No. 2 Table with, he claims, the very best results. He says he can proceed with the work in the day time and can then operate more easily than at night, and with no more likelihood of damaging the trees.

I have to acknowledge receipt of some very fine navel oranges from Mr. Martin, orchardist, of Martin's Creek.

"TESTING MILK AND CREAM."

THE demand for a handy and accurate means of ascertaining the quantity of commercial butter from any weight of cream, testing anything from 20 to 60 per cent., has justified the issue of the third edition of Mr. M. A. O'Callaghan's Cream Chart. Although 6,000 copies were issued in sheet form with the *Agricultural Gazette*, the first edition in book form was sold out a couple of months after its issue. A second edition was put in hand after orders had been received for about 3,000 copies, and this was soon exhausted.

The third edition was well applied for prior to publication, and there is every evidence that it will be distributed as rapidly as its predecessors.

Copies are available at the Government Printing Office. Price, 1s.; per post, 1s. 1d.

Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull.	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn ...	Imperialist ...	Florio	Lady Nancy of Minembah.	Berry Farm ...	*
" ..	The Irishman (imp.)	Tipperary Bull	Colleen Bawn (imp.)	Berry Farm ...	†
Jersey ...	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Yanco Farm ...	*
" ...	Trafalgar ...	Best Man ...	Rum Omelette	Cowra Farm ...	*
" ...	Kaid of Khartoum	Sir Jack ...	Egyptian Belle	H. A. College ...	*
" ..	Leda's Retford Pride.	Dinah's Lad ...	Leda's Angel..	Wagga Farm ...	*
Guernsey	The King's Mirror	Calm Prince ...	Vivid (imp.)...	Kyogle	4 July, '14.
" ...	Star Prince ...	Calm Prince ...	Vivid (imp.)...	Casino	21 Oct., '14.
" ...	Sky Pilot ...	Prince Souvia ...	Parson's Red Rose (imp.).	Maclean	11 Jan., '14.
" ...	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (6509)	Inverell	5 Oct., '14.
" ...	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	*
" ...	Claudius (imp.)	Golden Star II..	Claudia's Pride (imp.).	Murwillumbah ...	31 Dec., '14.
" ...	George III ..	King of the Roses	Calm 2nd ...	Mullumbimby ...	31 Mar., '15.
" ...	The Peacemaker	Calm Prince ...	Rose Petersen	Wollongbar ...	*
" ..	King of the Roses	Hayes' King ...	Rosey 8th (imp.).	Pambula	20 Dec., '14.
" ...	Lauderlad ...	Laura's Boy ...	Souvenir of Wollongbar	Casino	3 Sept., '14.
" ...	Belfast	King of the Roses	Flaxy 2nd ...	Tyalgum	— Nov., '14.
" ...	Royal Preel ...	Itchen Royal ...	Hayes' Lily du Preel (imp.).	Tyalgum	30 Nov., '14.
" ..	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Frederickton ...	— Sept., '14.
" ...	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	Paterson-Vacy ..	9 Sept., '14.
Ayrshire ...	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose...	Grafton Farm ...	*
" ...	Wyllieland Bright Lad (imp.)	Wyllieland Gleniffer (7229)	Wyllieland Sangie	Glen Innes Farm..	*
" ...	Isabel's Majestic	Majestic of Oakbank.	Isabel of Glen-eira.	Grafton Farm ...	*
Kerry... ...	Rising Sun ...	Bratha's Boy ...	Dawn ...	Bathurst Farm ...	*

*Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed.

E

Department of Agriculture,
Sydney, 2nd July, 1914

BULLS FOR SALE

AT BERRY EXPERIMENT FARM.

HOLSTEIN.—Colonel Neitenstein (355): date of birth, 26th April, 1912; colour, black and white; sire, Neitenstein, by Hollander; dam, Marjorie, by Chairman; g d Margaretha (imp.), 10,439; dam of sire, Dutch Oven by President. Price, **£15.**

Milk yields of dams :—	Milk lb.	Fat per cent.	Butter lb.
Marjorie	5,030	...	224
Margaretha (imp.)	10,990	...	407
Dutch Oven	8,671	3·6	365

IRISH SHORTHORN.—Irish Boy (577): date of birth, 9th April, 1912; colour, rich roan; sire, Limerick's Lad (imp.); dam, Colleen Bawn (imp.). Price, **42 guineas.**

Milk yield of dam :—	Milk lb.	Fat per cent	Butter lb
Colleen Bawn	6,937	3·8	309

GUERNSEYS.—Mountain Prince (593): date of birth, 12th January, 1913; colour, lemon and white; sire, Calm Prince; dam, Angelica 8th (imp.). Price, **30 guineas.**

Rohais' Lad (601): date of birth, 18th March, 1913; colour, lemon and white; sire, Calm Prince; dam, Rohais' Lassie (imp.). Price, **40 guineas.**

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Rohais' Lassie...	5,537	5·1	333

Othello (605): date of birth, 4th April, 1913; colour, lemon and white; sire, Trengwainton Village Favourite (imp.); dam, Desdemona 8th (imp.). Price, **35 guineas.**

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Desdemona 8th (imp.)	6,721	4·3	340

JERSEYS.—Golden Fox (586): date of birth, 7th December, 1912; colour, whole fawn; sire, Xmas Fox (imp.); dam, Golden Omelette, by Sir Jack; g d Rum Omelette 2nd, by Golden Lord; dam of sire, Malvoisie (vol. xx, p. 369), by Gay Boy, 7510. Price, **15 guineas.**

Milk yield of dams :—	Milk lb.	Fat per cent.	Butter lb.
Golden Omelette	3,064	5·6	202 (in 28 weeks)
Rum Omelette 2nd...	5,667	4·4	361

Dancing Fox (552): date of birth, 1st June, 1912; colour, whole fawn; sire, Xmas Fox (imp.); dam, Lady Gay, by Sir Jack; g d, Rum Omelette II, by Golden Lord; g g d, Rum Omelette (imp.). Price, **15 guineas.**

AT HAWKESBURY AGRICULTURAL COLLEGE.

AYRSHIRE.—The Corsair (483): date of birth, 6th May, 1911; colour, red and white; sire, Byron, by Auchenbrain Spicy Jock (imp.); dam, Ripple Rose, by Prince Emerald (imp.); g d, Rose Berry, by Mischief Maker of Barcheskie (imp.), 3892; dam of sire, Julia, by Peacemaker. Price, **15 guineas.**

Milk yields of dams :—	Milk lb.	Fat per cent.	Butter lb.
Ripple Rose	7,669	3·9	351
Rose Berry	5,799	4·1	280

BULLS FOR SALE—*continued.*

AT WOLLONGBAR EXPERIMENT FARM.

GUERNSEYS.—Sweetheart's Fido (398): date of birth, 8th March, 1913; colour, dark orange, little white; sire, Hayes' Fido (imp.); dam, Sweetheart, by The Admiral; g d, Souvenir of Wollongbar, by Vivid's Prince; g g d, Souvenir (imp.). Price, **30 guineas.**

Milk yield of dam :—	Milk lb.	Butter lb.
Sweetheart	4,962	255

Game Boy (407): date of birth, 27th July, 1913; colour, fawn and white; sire, Beaucaire's Baby; dam, Dido, by Royal Preel; g d, Miss Clatford (imp.), by Clatford Hope 2nd (1814 E.S.H.B.); g g d, Clatford Hopeful (imp.) (6811 E.S.H.B.). Price, **25 guineas.**

Milk yield of dam :—	Milk lb.	Butter lb.
Dido	5,000	262

GEORGE VALDER, Under Secretary, and
Director of Agriculture.

STALLION PARADES.

Date.		Place.	Time.
Monday,	13 July	Kempsey	10 a.m.
Tuesday,	14 ,,	Cumnock	11 a.m.
Wednesday,	15 ,,	Port Macquarie	10 a.m.
,,	15 ,,	Junee	10·30 a.m.
Thursday,	16 ,,	Molong	10 a.m.
,,	16 ,,	Wauchope	Noon.
,,	16 ,,	Cootamundra	10·30 a.m.
Saturday,	18 ,,	Lockhart	10 a.m.
,,	18 ,,	Taree	Noon.
Monday,	20 ,,	Forbes	11 a.m.
,,	20 ,,	Nabiac	11 a.m.
Tuesday,	21 ,,	Parkes	11 a.m.
,,	21 ,,	Wingham	11 a.m.
Wednesday,	22 ,,	Cudal	11 a.m.
,,	22 ,,	Gloucester	10 a.m.
Thursday,	23 ,,	Manildra	11 a.m.
,,	23 ,,	Dungog	11 a.m.
Monday,	27 ,,	Henty	10·30 a.m.
Wednesday,	29 ,,	Wagga	9·30 a.m.
Monday,	3 August	Condobolin	2·30 p.m.
Tuesday,	4 ,,	Bogan Gate	3·30 p.m.
Wednesday,	5 ,,	Trundle	10 a.m.
Thursday,	6 ,,	Orange	10 a.m.
Wednesday,	12 ,,	Temora	10 a.m.
Thursday,	13 ,,	Barmedman	2·30 p.m.
Friday,	14 ,,	Wyalong	11 30 a.m.
Monday,	17 ,,	Ardlethan	3 p.m.
Tuesday,	18 ,,	Richmond	11 a.m.
Wednesday,	19 ,,	Dural	11 a.m.
Thursday,	20 ,,	Penrith	11 a.m.
Friday,	21 ,,	Luddenham	Noon.
Monday,	24 ,,	Dubbo	10 a.m.
Tuesday,	25 ,,	Raymond Terrace	Noon.
,,	25 ,,	Gilgandra	2 p.m.
Wednesday,	26 ,,	Gulargambone	2 p.m.
Thursday,	27 ,,	Coonamble	2·30 p.m.
,,	27 ,,	Muswellbrook	3 p.m.
Friday,	28 ,,	Denman	10 a.m.
Saturday,	29 ,,	Scone	9·30 a.m.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1914.

Society.	Secretary.	Date.
Wentworth P., A., and I. Society	W. B. Crang	July 16
Deniliquin P. and A. Society	L. Harrison	,, 16, 17
Royal Agricultural Society Horse Show	H. M. Somer	Aug. 1-7
Narandera P. and A. Association	W. T. Lynch	,, 4, 5
Corowa P., A., and H. Society	John D. Fraser	,, 18, 19
Forbes P., A., and H. Association	S. H. Bates	,, 18, 19
Coolamon A. and P. Association	E. Owen	,, 18, 19
Murrumbidgee P. and A. Association (Wagga Wagga)	A. F. D. White	,, 25, 26, 27
Parkes P., A., and H. Association	G. W. Seaton	,, 26, 27
Wellington P., A., and H. Society	A. E. Rotton	Sept. 1, 2
Grenfell P., A., and H. Association	G. Cousins	,, 1, 2
Ariah Park P., A., H., and I. Association	J. N. Taylor	,, 1, 2
Gunnedah P., A., and H. Association	M. C. Tweedie	,, 1, 2, 3
Manildra P. and A. Association	A. Anderson	,, 2
Germanton P., A., and H. Society	Jas. S. Stewart	,, 2, 3
Albury and Border P., A., and H. Society	W. I. Johnson	,, 8, 9, 10
Young P. and A. Association	T. A. Tester	,, 8, 9, 10
Ganmain A. and P. Association	J. F. Ashwood	,, 15, 16
Cootamundra A., P., H., and I. Association	T. Williams	,, 15, 16
Cowra P., A., and H. Association	E. W. Warren	,, 16, 17
Murrumburrah P., A., and I. Association	J. A. Foley	,, 22, 23
Temora P., A., H., and I. Association	J. Clark	,, 22, 23, 24
Riverina P. and A. Society (Jerilderie)	J. Kennedy	,, 23
Canowindra P., A., and H. Association	G. Newman	,, 23, 24
Millthorpe A., H., and P. Association	C. J. E. Hawken	,, 29, 30
Yass P. and A. Association	W. Thomson	,, 30, Oct. 1
Hay P. and A. Association	G. S. Camden	Oct. 6, 7
Hillston P. and A. Society	S. J. Gordon	,, 14
Tweed River Agricultural Society	A. E. Budd	Nov. 11, 12
Lismore A. and I. Society	T. M. Hewitt	,, 25, 26, 27

1915.

Society.	Secretary.	Date.
Albion Park A., H., and I. Association	M. A. Brown	Jan. 20, 21
Kiama A. Association	G. A. Somerville	,, 26, 27
Wollongong A., H., and I. Association	W. J. Cochrane	,, 28, 29, 30
Berry A. Association	S. G. Banfield	Feb. 4, 5
Shoalhaven A. and H. Association	H. Rauch	,, 10, 11
Newcastle A., H., and I. Association	E. J. Dann	,, 10, 11, 12, 13.
Dapto A. and H. Society	J. H. Lindsay	,, 23, 24
Guyra P., A., and H. Association	P. N. Stevenson	,, 23, 24, 25
Uralla A. Association	H. W. Vincent	Mar. 2, 3, 4
Tenterfield P., A., and M. Society	F. W. Hoskin	,, 2, 3, 4
Camden A., H., and I. Society	A. Thompson	,, 3, 4, 5
Glen Innes & Central New England P. & A. Assoc'n	G. A. Priest	,, 9, 10, 11
Coramba District P., A., and H. Society	H. E. Hindmarsh	,, 10, 11
Tumbarumba and Upper Murray P. and A. Society	E. W. Figures	,, 10, 11, 12
Inverell P. and A. Association	J. McIlveen	,, 17, 18, 19
Goulburn A., P., and H. Society	G. G. Harris	,, 18, 19, 20
Quirindi P., A., and H. Association	H. H. Rourke	,, 23, 24
Upper Hunter P. and A. Association	R. C. Sawkins	,, 24, 25, 26
Crookwell A., P., and H. Society	J. H. Huxley	,, 25, 26
Dungog A. and H. Association	C. E. Prout	April 28, 29

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Agricultural Gazette of New South Wales.

Sheep and Wool for Farmers.

CROSS-BREEDING EXPERIMENTS FOR 1910-11-12-13.

THE WOOL AND MUTTON TYPE.

[Continued from page 9.]

J. WRENFORD MATHEWS.

Wagga Experiment Farm Results—Body Weights.

IT will now be interesting to learn how far these results are borne out in comparison with the body and fleece weights. The former will be taken first, and in this respect the crosses will be contrasted at the different ages.

In reviewing these returns the outstanding difference is again shown between what constituted a good and a bad year, respectively. Whereas in 1911 (during which year fair average conditions prevailed) the body weight for all Long-wool crosses was 111 lb., these in 1912 (at the same age) weighed only 68 lb. 14 oz. on the average. The extent to which a sheep will deteriorate under adverse conditions is again shown on comparing the weights of the lambs dropped in 1911 with the records of the same animals taken again in 1912. In the former year, when the lambs were 5 months old, the weight averaged 69 lb. 9 oz., whereas for 1912 a weight of only 68 lb. 9 oz. was recorded. In noting how the various crosses fared under these circumstances, as the figures indicate, the loss of weight recorded was for both the L_1M and L_2M combinations. The L_3M crosses, however, showed a slight gain. Consistent results are again shown in the returns, which are given for the seventeen and twenty-nine months (two and four tooth stages). Whereas in 1911 the body weights for the L_1M, L_2M, and L_3M at the two-tooth (seventeen months) stage were 115, 104, and 114 lb. respectively, the same crosses at the following shearing weighed only 112, 99, and 113 lb., respectively.

Amongst the ewes for the same crosses, and for corresponding years, the older sheep were lighter, but due allowance must be made, as the greater number at this latter age reared lambs. Beyond recording particulars respecting their body and fleece, it is not the intention at this stage to enter into a discussion regarding the merits of the ewes representative of these crosses. That phase of the question can best be dealt with when summarising the results from the standpoint of the most suitable cross for export as lambs.

Reviewing the body weights, little difference is shown between the L_1M and L_3M crosses, taken at all ages. Consistently lower averages, however, have been recorded for the L_2M crosses. Contrasting the averages collectively, and for each cross for the full period (exclusive of the lambs), it is singular that the L_1M and L_3M crosses are practically level with a body

weight of 118 lb. Similarly, the L_2M crosses furnish a body weight of 108 lb. However, considerable differences occur when the ages are averaged separately. Divided accordingly, the L_3M crosses show an increase at every stage, except that at 2 years 5 months.

The following table shows the combined averages, also the relative position of the different crosses at their various ages. Further, there is indicated the increase in weight from one year to another, lambs being included.

Age.	Cross	No.	Body Weight.	Number of year's records.
			lb. oz.	
Four to five months	L_1M	16	63 3	Four
"	L_2M	52	60 3	"
"	L_3M	47	64 4	"
One year four months	L_1M	15	91 6	three
"	L_2M	21	90 2	"
"	L_3M	22	99 11	"
Two years four months	L_1M	14	123 0	two
"	L_2M	13	111 0	"
"	L_3M	13	121 0	"
Three years five months	L_1M	4	161 8	one
"	L_2M	3	140 0	"
"	L_3M	3	168 0	"

As no wethers at the age of five months were available in 1912 for the L_1M crosses, the three ewes which constituted the drop have been substituted.

The following summary gives the increase in body weight from year to year:—

Cross.	From 4 months to 1 year 4 months.	From 1 year 4 months to 2 years 4 months.	From 2 years 4 months to 3 years 5 months.
	lb.	lb.	lb.
L_1M	28	30	34
L_2M	32	21	22
L_3M	37	29	47

As already indicated, these results cover good and bad years. In contrasting them, the most notable exception is shown in the increase recorded for the L_3M crosses, especially between the 2 years 4 months and the 3 years 5 months stages. For the latter, however, the averages include only three sheep; therefore, before final conclusions are drawn, it would be well to see whether this condition be confirmed during succeeding years. The result, nevertheless, is not alone in consistency, as a comparison of similar crosses with the ewes will show, though contrary to expectations, a proportionately greater increase, both in body and fleece, was exhibited for these during this stage than during any other period.

The Fleece Weights.

Finally, we come to the wool value, and before computing the returns this is reviewed separately. As in the body weights, considerable differences distinguish between the crosses at the various ages. The most notable differenc is

again illustrated between a fair average and a lean year. At one age alone, namely, 17 months, a difference of 5 lb. 5 oz. on the average is shown between 1911 and 1912 for the Long-wool crosses combined. Again, a comparison of the same sheep, but at a year older, will show the extent to which they actually lost weight during the latter year. In 1911, the average fleece weight for all LM crosses (wethers) was 13 lb. 1 oz., whereas, though a year older, only 9 lb. 11 oz. was recorded in 1912. Calculated for all ages, as was done in connection with the body weights, the following represents the combined averages:—

Cross.	Weight of Fleece.
L_1M	12 lb. 3 oz.
L_2M	11 ,, 2 ,,
L_3M	11 ,, 3 ,,

Separated according to age and worked out for the full term, the following are the results. Included, also, are the fleece weights of the lambs:—

TABLE showing Fleece Weights at various ages.

Age.		No. of Years' Record.	Fleece Weights.					
			L_1M.		L_2M.		L_3M.	
yrs.	months.		lb.	oz.	lb.	oz.	lb.	oz.
0	5	3	2	13	2	11	2	9
1	4	3	11	8	10	1	10	2
2	4	2	11	2	11	3	11	3
3	5	1	14	15	14	2	14	0

It should be noted that the sheep were all blade shorn.

Reviewing the results collectively, and comparing one year with another, it will at once be seen that the L_1M crosses are constantly in advance of the others in respect of fleece weight. However, before the wool value of any of the crosses can be determined, there are other conditions which must necessarily be taken into account. Referred to here is the "quality" of the wool. Whilst frequently used in the general sense of description, the term here implies a limited and definite meaning, signifying the coarseness or fineness of the wool. Though the fleeces of the L_1M crosses were heavier, yet, while exhibiting certain variations, that wool was coarser in quality than that of either the L_2M or L_3M. But the value of wool is not alone determined by quality. There is another agent whose presence in wool must be fully taken into account before value can be arrived at, and with which quality is closely allied; this is "condition"; meaning the loss of weight or the shrinkage incurred during the process of cleansing. All wools of cross-breds, or, for that matter, wools of any other breeds, do not lose a like amount of condition. Although condition in the main is regulated by quality, or, in other words, the finer the wool the more condition it contains, yet, under varying circumstances and seasonal conditions, wool of like quality may vary in condition. In order to obtain data in this relationship, the fleeces of the different crosses have each year been classified into order of group and quality. Representative samples have then been taken and subjected to laboratory test, and their yielding value ascertained.

A special table has been prepared embodying these particulars, and is given hereunder :—

TABLE showing the Classification, Clean Scoured Yield, the Estimated and Test Value of the Wool produced by the different crosses :—

Cross.	Sex.	No. of Fleeces.	Quality Count	Clean Yield.	Value. "Top."	Value. Greasy.
Age—1 year 5 months. Year 1911.						
				per cent.	d.	d.
L_1M	Ewes & Wethers	5	50's	62	18	8¾
,, ...	,, ,, ...	17	46's	66	15	7¾
L_2M	,, ,, ..	18	50's	59	18	8¼
,, ...	,, ,, ...	6	46's	65	15	7¾
L_3M	,, ,, ...	7	56's	58	20	9
,, ...	,, ,, ...	22	50's	60	18	8½
Ages—1 year 4 months, and 2 years 5 months. Year 1912.						
L_1M	Ewes & Wethers	13	50's	61	21½	10½
,, ...	,, ,, ...	27	46's	69	18½	10
,, ...	,, ,, ...	9	44's	67	18	9½
L_2M	,, ,, ...	11	58's	49	26½	10
,, ...	,, ,, ..	15	56's	52	24½	10
,, ...	,, ,, ...	15	50's	57	21½	9¼
,, ...	,, ,, ...	8	46's	65	18½	8¼
L_3M	,, ,, ...	14	58's	51	26½	10¾
,, ...	,, ,, ...	26	56's	55	24½	10¾
,, ...	,, ,, ...	22	50's	54	21½	9¼
,, ...	,, ,, ...	3	46's	65	18½	8¼
Ages—2 years 4 months, and 3 years 5 months. Year 1913.						
L_1M	Ewes	5	56's	61	23	11
,, ...	,, ...	8	50's	64	21	10½
,, ...	,, ...	15	46's	66	17	8¾
,, ...	,, ...	5	44's	69	16	8½
Ages—1 year 4 months, 2 years 4 months, and 3 years 4 months.						
L_2M	Ewes	7	58's	57	26	11¼
,, ...	,, ...	11	56's	58	23	10¼
,, ...	,, ...	34	50's	64	21	10½
,, ...	,, ...	3	46's	66	17	8½
L_3M	,, ...	5	58's	57	26	11¼
,, ...	,, ...	23	56's	64	23	11½
,, ...	,, ...	37	50's	67	21	11¼
,, ...	,, ...	13	46's	70	17	9¼
Wethers.						
L_1M	29 months ...	3	56's	58	23	10¼
,, ...	,, ...	6	46's	68	17	9¼
,, ...	42 ,, ...	2	46's	63	17	8¼
,, ...	,, ...	2	44's	75	16	9¼
L_2M	16 ,, ..	4	56's	48	23	8¾
,, ...	,, ..	4	50's	56	21	8½
,, ...	28 ,, ...	4	56's	49	23	8½
,, ...	,, ...	4	46's	64	17	8¼
,, ...	42 ,, ...	1	50's	60	21	9¾
,, ...	,, ...	1	46's	64	17	8¼
L_3M	16 ,, ...	4	50's	61	21	10
,, ...	,, ..	3	46's	67	17	9
,, ...	29 ,, ...	1	58's	54	26	10¾
,, .. .	,, ...	5	56's	58	23	10¼
,, ...	,, ...	1	50's	63	21	10¼
,, ...	,, ...	2	46's	63	17	8¼
,, ...	42 ,, ...	3	50's	63	21	10¼

Lincoln-Merino crosses. 3 years.

Leicester-Merino crosses. 3 years.

Border Leicester-Merino crosses. 3 years.

CROSS-BREDS AT WAGGA EXPERIMENT FARM.

The valuations here given are based on the current rates for "tops" ruling for the years mentioned on the Bradford (Home) market. The prices given for the greasy value indicate what the wool would have realised if sold on the Australian market, covering all expenses, and the top prepared in Bradford. (For those not familiar with the term "top," reference should be made to page 53 of the Bulletin, "Sheep and Wool for Farmers.")

Concerning the values, those for 1911 were estimated (the kind services of a well-known buyer operating on behalf of Home manufacturers being availed of for the purpose); while those for 1912 and 1913, respectively, in each case represent percentage yields as the result of an exhaustive series of tests conducted. All samples were taken from the major portions of the fleece, no low skirtings or locks being included. As, however, these latter represent but a small proportion, they do not affect the value to any very material extent. As set out, therefore, the figures will serve for all comparative purposes.

The Yielding Value of the Wool.

It may be instructive to note that condition is not always consistent with quality, although, as a rule, the coarser the wool the higher its yielding value, and *vice versâ*. Taking similar qualities, and for corresponding years, it will be seen that the tendency is for the L_3M crosses to produce on the average a higher yielding wool than either of the other two. This, as the returns show, is apparent more in relation to the L_2M than the L_1M crosses.

Exclusive of the year for which the yields were estimated only, the following computation shows the average clean yield of wool in respect of the qualities named, as well as the crosses by which they were produced :—

Cross.	Count.	No.	Average Yield.	Cross.	Count.	No.	Average Yield.	Cross.	Count.	No.	Average Yield.
			per cent.				per cent.				per cent.
L_1M	58's	...	...	L_2M	58's	18	52·3	L_3M	58's	20	52·6
	56's	8	60		56's	34	53		56's	54	59
	50's	21	62		50's	54	61·3		50's	67	62·1
	46's	50	67		46's	16	65		46's	21	67·7
	44's	16	70								

Variation in the Quality of the Wool.

It is also of value to see to what extent quality is variable in the crosses, and the above summary serves as a means of comparison in this connection. Taking the records of the classification, it is shown that the L_1M crosses are on the whole coarser in fleece than either of the other strains, though exhibiting consistent variations. Among these latter it will be noticed that the majority are of and above the 50's standard, whereas in the former this "count" forms the divisional line, separating the finer from the coarser grades. Although only what might have been expected from an intimate knowledge of the wool peculiar to and produced by parent stock, yet the variation apparent is not in agreement with what is representative of them.

For example, as the charts which are shown in chapter V of the Bulletin referred to illustrate, the standard quality or count given for the Leicester is included in the range of 40's, and, allowing for slight typical variations, a 44's and 46's in the case of the Border Leicester. Therefore, comparing these with the quality of wool produced by the progenies, and taking the number represented proportionately, it would appear that the disposition of the Leicester is to be productive of a finer wool than that produced relatively by the other breeds. If throwing true to type the half-bred L_2M combination would be represented by a wool of a 50's class, provided, of course, that a 60's Merino had been employed. In this connection, however, out of a possible 122 fleeces, while 54 were of that count, included were 52 which were finer, and 16 which were coarser. Similarly, while the half-bred L_3M ranks in the region of a 56's quality, out of a total of 162 fleeces, 67 were of the 50's order, 54 of the 56's (the half breed), 20 of the 58's, indicating the number throwing to the Merino, and leaving a balance of 21 in which the sire predominated.

Again, as a further example of the inequality of the parent stock with regard to wool as represented in the cross, we have in the L_1M crosses (in which case the half-bred stands at 46's), 29 above and 16 below the mean, out of a total of 95, further illustrating the predominance of the Merino.

Commenting further on the wool production of these three breeds, it was noted that, proportionate to quality, the length of that of the L_3M crosses was superior to that produced in similar grades by the other breeds. Evidence of this is afforded not only from actual observation, but also from a comparison of the clean yield results as shown in the table. When handled it was appreciably softer, and although no distinction was made of this in setting the valuations, nevertheless, from a manufacturing standpoint, it was undoubtedly the more valuable.

Taken collectively, the following shows the average price per pound set on the wool of these different breeds. The ewes have in this instance been included :—

Cross.	No of Fleeces.	Average Price per pound.
		d.
L_1M	117	9·40
L_2M	146	9·42
L_3M	191	10·22

The Aggregate Value of Wool and Mutton.

What appears the most difficult of all is the computing of the aggregate value of both wool and mutton. This is not so difficult to arrive at in the case of the wool as it is to arrive at, with anything like an accurate value, in respect of the mutton. The wool is marketable from year to year, whereas the sheep are retained on the farm. Valuations which have been obtained in former connections may serve as a guide in setting out these returns. The carcases exhibited and valued on a basis of export requirements, at the Sheep Show, particulars of which have already been published, and allowing for

current fluctuations in value, discriminate between ages and weights in the following order:—

Sheep weighing from 90 to 100 lb., carrying a nine months' fleece, and dressing from 50 to 60 lb., 2¼d. to 2½d. per lb.

Sheep weighing from 100 to 190 lb., carrying a nine months' fleece, and dressing from 60 to 100 lb., 1⅞d. to 2⅛d. per lb.

Thus a sheep when in full fleece will dress about half its live weight. A fairly correct estimate of mutton value may therefore be arrived at by taking the averages which have been given for the body weights, adding thereto the average weight of fleece, and halving the total. For illustration, take the combined averages given for the L_1M crosses at say the year and five months' stage; the weights here are 91 lb. 6 oz. and 11 lb. 8 oz., respectively. Added together, these give a total of 102 lb. 14 oz., which, on being halved, shows a dressed weight 51 lb. 7 oz., which is as near to the correct weight as can possibly be obtained.

TABLE setting out the Aggregate Value of the different crosses, and at different ages, for Wool and Mutton.

Cross.	No.	Body. Weight. Live.	Body. Weight. Dressed.	Body. Value. per lb.	Body. Value. Total.	Fleece. Weight.	Fleece. Value. per lb.	Fleece. Value. Total.	Aggregate Value.
		lb. oz.	lb. oz.	d.	s. d.	lb. oz.	d.	s. d.	s. d.
Age, 1 year 4 months. *Wethers.*									
L_1M ...	15	91 6	51 7	2½	10 10	11 8	9¼	9 0	19 10
L_2M ...	10	90 2	50 1	2½	10 5	10 1	9	7 6½	17 11½
L_3M ...	22	99 11	55 3	2½	11 6	10 12	9⅗	8 5	19 11
Age, 2 years 4 months.									
L_1M ...	14	123 0	67 6	2⅛	11 11½	11 12	10	9 9½	20 9
L_2M ...	13	111 0	61 1	2⅛	10 9½	11 3	9¼	7 8¼	18 5¾
L_3M ..	13	121 0	66 1	2⅛	11 8	11 3	10	9 4	21 0
Age, 3 years 5 months.									
L_1M ..	4	161 8	88 3	1⅞	13 9	14 15	9	11 2½	24 11½
L_2M ...	3	140 5	77 3	1⅞	12 0	14 2	9	10 7⅛	22 7⅛
L_3M ...	3	168 10	91 8	1⅞	14 3	14 6	10¼	12 3½	26 6½
Age, 1 year 4 months. *Ewes.*									
L_1M ..	37	83 5	47 6	2½	9 10	11 8	9⅓	8 10	18 8
L_2M ...	64	81 0	45 2	2½	9 4½	9 4	9	7 0	16 4½
L_3M ...	78	91 6	50 6	2½	10 6	9 6	9⅗	7 4¼	17 10¼
Age, 2 years 4 months.									
L_1M ...	32	75 14	42 9	2⅛	7 6	9 4	10	7 8½	15 2½
L_2M ...	35	81 4	45 4	2⅛	8 0	9 5	10½	8 1¾	16 1¾
L_3M ...	50	82 6	45 8	2⅛	8 1	8 10	11	7 11	16 0
Age, 3 years 5 months.									
L_1M ...	15	105 3	58 1	2	9 8	11 0	10	9 3	18 11
L_2M ...	10	100 8	55 9	2	9 3	10 10	10½	9 4¼	18 7¼
L_3M ...	25	117 8	64 11	2	10 9½	11 14	11	10 1	20 10½

"The Nature of Drought."

Under this title an interesting bulletin has been written by V. G. Rotmistrov, Director of the Odessa Experiment Field, based upon investigations he has been conducting during the past nineteen years.

He quotes, as the most detailed account of drought and the means of contending against it, what was stated by A. Shishkin about forty years ago, and it is of interest to note how this authority anticipated much that is current practice in crop production in areas of low rainfall to-day.

If one were asked to summarise the methods by which dry farming can be profitably carried on in Australia, the following would certainly find a place:—

1. Fallowing with a view to conservation of moisture.
2. Shallow cultivation of the fallow to keep down weeds.
3. Selection of suitable varieties of seed.
4. The growth of a rotation crop wherever possible, to be ploughed in to increase the humus content of the soil.

Many Australian farmers are putting these principles into practice now, and are of opinion that they are quite modern. A perusal of the means which this investigator suggested forty years ago as being of value in minimising the effects of drought will show how old many of the recommendations are.

The bulletin, though produced in Odessa, has been translated from the Russian and is printed in English. Allowance must be made for a certain inevitable obscurity of meaning due to the difficulties of translation.

A. Shishkin brought down the means of contending against drought to the following points:—

1. To establish, if possible, connection with the bed-water and the soil layer.
2. Deep mellowing (the mellowing of the subsoil should be repeated approximately every five years) of the soil for the greater accumulation and better storage of water for the better development and deeper penetration of the roots and for the attainment of firmer structures.
3. The incorporation into the soil of a structure for regulating the penetration and evaporation of water.
4. Increasing the quantity of humus in the soil to improve the relations between soil and water, and to obtain more durability of structure.
5. Manuring the soil with dung, artificial manure, and salts for the accumulation of humus in the soil for rich and more complete development of roots, and for more productive expenditure of water.
6. Seasonable tillage of fields for a larger accumulation of moisture in the soil.
7. Constructing open ditches and using the mould-plough, instead of the ordinary subsoil plough, to catch running water more completely.
8. Introducing ploughed fallow to accumulate more moisture in the soil.
9. Using implements for spring tillage which do not turn over the upper layer.
10. Early promotion of spring sowing in order that plants should reap greater benefit from the moisture accumulated during winter, and give shade to the soil more quickly.
11. A perfect system of sowing, and unremitting attention to plants during growth.
12. Suitable selection of cultivated plants, species and seed, and a corresponding suitability of cultivation.
13. Improving the productiveness of fallowed land; and
14. Looking out for land lowly situated where there is supply of ground water for lucerne, esparcet (*i.e.* Sainfoin) and rhizocarps (certain aquatic plants).

Grasses at Hawkesbury Agricultural College.

E. BREAKWELL, B.A., B.Sc., Agrostologist.

ALTHOUGH the soil at Hawkesbury Agricultural College is not of a good character, there are many grasses which stand the adverse conditions remarkably well.

The principal of these are:—

Eragrostis leptostachya, Steud (Paddock Love-grass) ...	Fig. 1
Eragrostis curvula, Nees	
Andropogon intermedius, R.Br (Blue grass)	Fig. 2
Poa arachnifera, Torr. (Texas Blue grass)	Fig. 3
Poa pratensis, Linn. (Kentucky Blue grass)...	
Poa sempervirens, Linn. (Evergreen Wood Meadow grass)...	
Poa compressa, Linn. (Canada Blue grass)	
Pollinia fulva, Benth. (Sugar grass)	Fig. 4
Bromus inermis, Linn. (Awnless Brome grass)	Fig. 5
Bromus unioloides, H.B. et K. (Prairie grass)	
Bromus pumpellianus, Scribn.	
Chloris gayana, Kunth. (Rhodes grass)	Fig. 6
Chloris barbata, Sw. (Australian Rhodes grass)	Fig. 7
Paspalum dilatatum, Pois.	Fig. 8
Paspalum virgatum, Linn.	
Setaria nigrirostis, Durand and Schinz	Fig. 9
Phalaris bulbosa	Fig. 10
Festuca elatior, Linn. (Tall Fescue)	Fig. 11
Festuca arundinacea, Vill.	
Festuca ovina, Linn. (Sheep's Fescue)	
Festuca duriuscula, Linn. (Hard Fescue)	

Eragrostis leptostachya (Paddock Love-grass) is a native, and appears particularly adapted to soils of a light or sandy nature. It forms one of the principal constituents of the pastures of the Hawkesbury sandstone formation of the County of Cumberland, of the Permo-Carboniferous sandstones of the Maitland district, and of the Triassic sandstones of the Clarence River. Under cultivation the grass is doing well at the College. It is a heavy seeder, yielding a very small seed, which appears capable of easy germination. The grass commences its growth early in spring, and continues till well into May.

Eragrostis curvula is one of the grasses recently introduced from America. There are two varieties, the true *E. curvula* and *E. curvula* var. *valida*. This grass is particularly adapted for growing under adverse conditions, such

as light soils and districts with a small rainfall. The harsh nature of the leaves, however, render them of limited value from a feeding point of view. At the College, *Eragrostis curvula* does not grow nearly so high as *E. curvula* var. *valida*. The latter has a thick growth, about 3 feet high, and seeds heavily.

Andropogon intermedius (Blue grass).—This is a native grass which appears particularly adapted to the soils of the College. This is somewhat surprising, considering that its native habitat is on alluvial formations on creek and river banks, or on moist black soils in general. The grass is a heavy seeder, but, so far, only a limited amount of success has been obtained by laying down to seed. One hundred per cent. strike has been obtained from root planting at the College. From a fodder point of view the grass is all that can be desired, yielding a heavy succulent flag, which remains green from September to well into May. It is very sensitive to frosts. At the College the grass is often attacked by a fungus, which Mr. E. Cheel, of the Botanic Gardens, identifies as belonging to the genus Cerebella.

Poas.—The principal Poas at the College are *Poa arachnifera* (Texas Blue grass), *Poa pratensis* (Kentucky Blue grass), *Poa sempervirens* (Evergreen Wood Meadow grass), and *Poa compressa*, L. (Canada Blue grass).

Poa arachnifera (Texas Blue) is the most vigorous grower of the Poas, and appears well adapted to the light soils. It may readily be distinguished from the other Poas in its broader and longer leaves, and in its vigorous spreading root system. Propagation by seed is an uncertain process, but it readily spreads if root planting is resorted to.

Poa pratensis (Kentucky Blue grass).—The root system of this grass is also well adapted for quickly covering the ground. The creeping root-stocks in the surface soil grow so densely that a firm sod is produced. At the College the grass suffers very much in the summer, nor will it grow so vigorously at any time as Texas Blue or Evergreen Meadow grass.

Poa sempervirens (Evergreen Meadow grass). This grass is really a variety of *Poa nemoralis*, and is called in England by the name of Hudson's Bay or Evergreen Meadow grass. It is well named, for it remains beautifully green during the heaviest of frosts, and it grows fairly vigorously during the colder months of the year. Its texture is also finer than most of the other Poas.

Poa compressa - Although this grass produces only a small quantity of foliage it is particularly valuable, inasmuch as it is very nutritive, and remains green during the greater part of the year. Its vigour at the College shows its adaptability to poor soils; and its capability of enduring a limited rainfall is shown by its permanent character at the Cowra Experiment Farm. The grass is a native of Norway, Sweden, Prussia, Germany, France, Switzerland, Italy, Russia, Greenland, Iceland, and the northern parts of America. It will grow at an elevation of 3,000 feet.

Pollinia fulva (Sugar grass).—A native grass which grows well at the College, and has many virtues. Its flag is very succulent, and it is particularly drought-resistant. It will also stand a large amount of feeding off.

Fig. 1. *Eragrostis leptostachya* (2), and *E. curvula* (3) compared.
Echinopogon ovatus (1) has proved somewhat unsatisfactory.

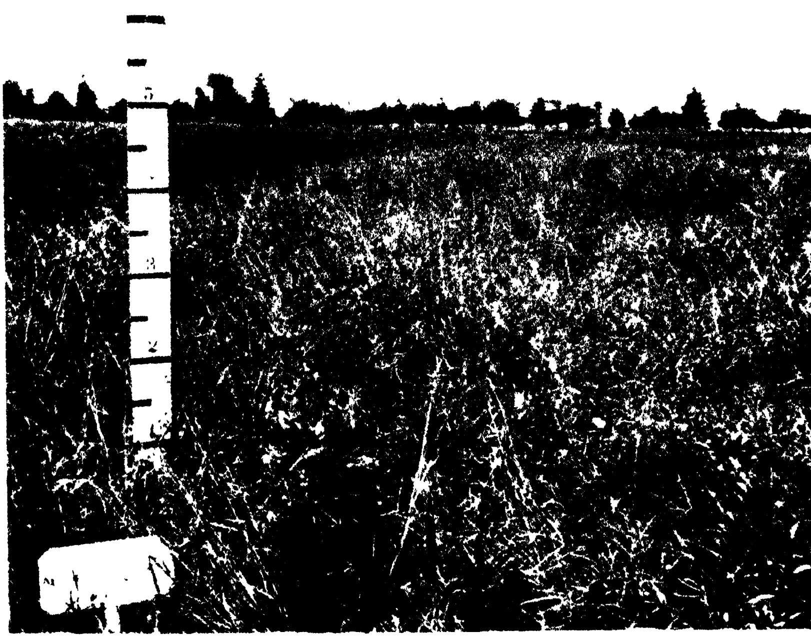


Fig. 2.—*Andropogon intermedius* (Blue grass).

GRASSES AT THE HAWKESBURY AGRICULTURAL COLLEGE.

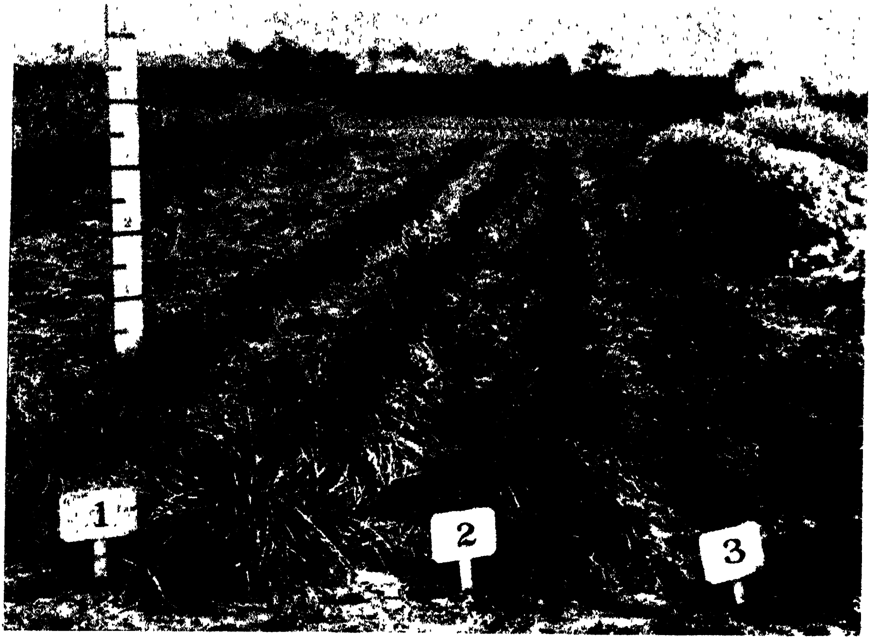


Fig. 3.—Reading from left to right:—*Poa pratensis* **(unnumbered).** *Poa arachnifera* **(1).** *Poa sempervirens* **(2).** *Poa compressa* **(3).**

Fig. 4.—*Pollinia fulva* **(Sugar grass).**

GRASSES AT THE HAWKESBURY AGRICULTURAL COLLEGE.

Fig. 5.—*Bromus inermis* (1)
,, *unioloides* (2) compared.
,, *pumpellianus* (3)

Fig. 6.—*Chloris gayana* (Rhodes grass).

GRASSES AT THE HAWKESBURY AGRICULTURAL COLLEGE.

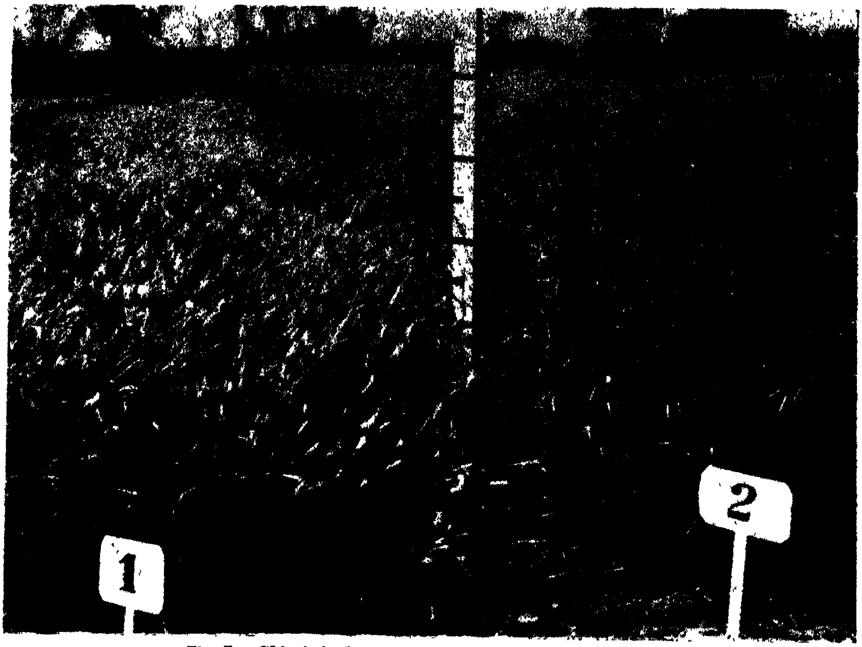


Fig. 7.—*Chloris barbata* (1) and *Chloris gayana* (2) compared.

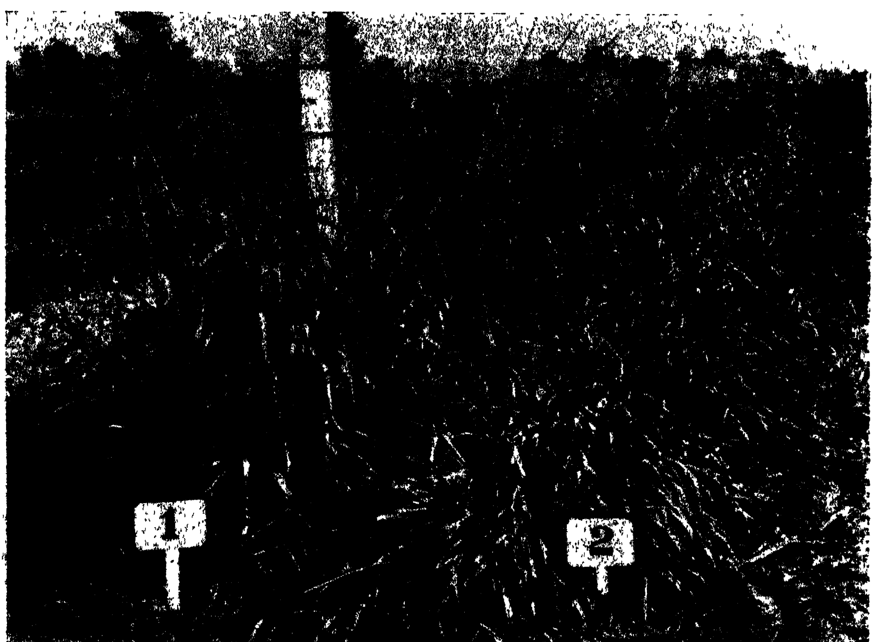


Fig. 8.—*Paspalum virgatum* (1) and *Paspalum dilatatum* (2) compared.

GRASSES AT THE HAWKESBURY AGRICULTURAL COLLEGE.

Its drought resistance is as great as, if not greater than, any other succulent native grass. It has a brown flower spike, which produces seed rather feebly. So far, the seed production of this grass has been found to be somewhat disappointing, but sufficient data from other parts are not available to say whether this disadvantage is general.

The Brome grasses at the College are all introduced. Many, like *Bromus sterilis*, *B. maximus*, and *B. mollis*, are of a useless character, and grow as weeds; but others, like *Bromus inermis*, *B. unioloides*, and *B. pumpellianus*, are very valuable.

Bromus inermis (Awnless Brome grass).—This is a native of Europe, and a grass which has met with great success in the United States of America. At the College the seed germinates readily, and grows sufficiently strong to combat the weed growth. It remains green the greater part of the year, and endures summer conditions better than does *Bromus unioloides*. It is rather an unprepossessing-looking grass, with its leaves of a dirty dark green colour; but, in spite of this fact, it is very nutritive, and stands stocking well.

Bromus unioloides (Prairie grass).—A very succulent grass of a bright green colour, which produces a large quantity of feed during the cooler months of the year. The grass grows wild all over the College areas, and is readily eaten by stock. Under cultivation it yields heavily, but when stocked it disappears rather suddenly—that is, when fed off the grass is an annual in nature; but if grown and cut for hay, the new plants spring from the old root stocks of the previous year, thus becoming perennial in habit.

Bromus pumpellianus.—This is one of the newer Brome grasses. So far, it has made a very promising growth, and appears worthy of further trial.

Chloris gayana (Rhodes grass).—This grass has already been commented on by Mr. J. H. Maiden (*Agricultural Gazette*, vol. 17, p. 1206). Since the latter date its cultivation has rapidly spread; and for producing the quickest growth on the lighter soils, it appears to have no equal. At the College it seems to hold its own readily enough with Couch grass. It seeds heavily. A noticeable feature about this grass at the College and at places elsewhere is the fact that although it produces running root stocks the amount of flag produced from the rooting nodes of such stocks is surprisingly small, and for its flag the grass is more or less dependent on the original and primary root.

Chloris barbata (Australian Rhodes grass).—A native grass, and just recently introduced at the College. As seen in the photograph, it does not produce the same amount of growth as does Rhodes. This also happens at Nyngan Demonstration Farm. The seed-head differs from that of Rhodes, being easily shattered and of a white appearance. The secondary root system, *i.e.*, the roots from the nodes of the horizontal root stocks, seem to be more feebly developed than that of Rhodes, and appears to depend on the original root for its flag even more than in the case of Rhodes. Not much is yet known about its grazing possibilities nor about its drought resistance.

Paspalum dilatatum.—Comment has already been made on this grass (*Agricultural Gazette*, Vol. 10, p. 32). The conditions at the College are not so adapted to it as elsewhere. The photograph is intended to show the

difference between it and *Paspalum virgatum.* The latter has a more upright tendency, is more woody, the leaves less succulent, and it possesses a deeper root system. The stooling and semi-prostrate habit of *P. dilatatum* is very pronounced compared with that of *P. virgatum.*

Setaria nigrirostis.—This grass has made good in the Transvaal, where it is spoken of as an excellent vlei land pasture grass, thriving well in newly-broken veldt. At the College the growth is remarkably vigorous, while at the same time its flag does not become coarse. Its success warrants further trial in cultivation.

Phalaris bulbosa is one of the best winter grasses yet introduced at the College. Commencing to come away early in the autumn, it grows fairly well in the winter and late into the spring. It is a good stooler, produces a dense growth of broad and succulent leaves, and grows readily from seed.

Fescue Grasses.—The principal fescue grasses grown at the College are *Festuca elatior*, *F. arundinacea*, *F. ovina*, *F. rubra*, and *F. duriuscula.*

Festuca elatior and *Festuca arundinacea*, as seen in the photograph, closely resemble one another. Both are characterised by a densely-tufted growth and broad leaves. The leaves of the former, however, are somewhat narrower than are those of *F. arundinacea*, those of the former being about $\frac{1}{2}$ inch broad, and those of the latter about $\frac{3}{4}$ inch.

Festuca elatior does well on the poor soils of the College, and stands the dry summers fairly well. This is in accord with its habit in other countries. On the grass lands of Cotswold Hills, in England, for instance, it thrives on the thin soils, withstands the dry conditions well, and provides 21 per cent. of the hay crop of the field.

F. arundinacea is a variety largely grown in New Zealand.

Festuca ovina, *F. rubra*, and *F. duriuscula.*—These grasses have much finer leaves and smaller growth than the two previous named. They all closely resemble each other. All will grow in light soils.

The photographs illustrating these notes were supplied by the Hawkesbury Agricultural College.

Seed Testing for Farmers.

The Department is prepared to test vegetable and farm crop seeds. Reports will be given stating the germination capabilities of the seed, its purity, and the nature of the impurities, if any.

Communications should be addressed to the Director, Botanic Gardens, Sydney. Not less than 1 ounce of small seeds such as lucerne, or 2 ounces of large seeds like peas, should be sent. Larger quantities are to be preferred. Seeds should be accompanied by any information available as to origin, where purchased, age, &c.

If a purity report only is desired, it should be so stated, to secure a prompt reply. Germination tests take from six to twenty days, according to the seed.

Fig. 9.—*Setaria* [illegible]

Fig. 10. *Phalaris bulbosa* (3). Nos. 1 *Pennisetum longistylum* and (2) *P.* [illegible] are vigorous growers but unsatisfactory, owing to harshness of flag and coarse seed-heads.

GRASSES AT THE HAWKESBURY AGRICULTURAL COLLEGE.

Fig. 11.—*Festuca elatior* (1)
arundinacea (2)
ovina (3)
duriuscula (4) **compared.**

GRASSES AT THE HAWKESBURY AGRICULTURAL COLLEGE.

Cowpeas.

Vigna catjang (ENDL.); *Vigna unguiculata* (WALP.).

J. W. HADFIELD, Instructor in Agriculture, Hawkesbury Agricultural College.

THE cowpea is a summer growing annual, more closely related to the bean than to the pea. Its habit of growth may be recumbent, semi recumbent, or upright, depending on the variety, the soil, and such conditions as the thickness of seeding. It is not a true climber, having no tendrils, but the long vines twine around any adjacent support and cling to it. The leaves are trifoliate, the flowers variable in colour, but usually whitish or whitish purple, while the pods and seed vary considerably in shape, size, and colour

Every year this plant plays a more important part in farming economy As a summer green manure it can hardly be excelled It is grown as a forage crop, and either fed off, soiled, or mixed with other material and converted into silage. Though it is very difficult to harvest and handle, yet it makes an excellent hay. The young pods can be used for human consumption, while the ripe seed commands a constant and satisfactory price on the market

The plant thrives best under warm and moist conditions, and, while it readily adapts itself to dry weather, it must be warm or the plant will not develop. Its home and origin is probably in or near India, where it is claimed to have been cultivated for two thousand years

It came into general cultivation in New South Wales between 1890 and 1892 Its early development was largely due to the offer made by Mr. F. W. Knox, General Manager of the Colonial Sugar Refining Company, in which he supplied farmers with seed, and bought the resulting crop at 12s. 6d. to 15s. per bushel. The Department of Agriculture co operated in this, and a large quantity of seed was distributed in small lots. From that time on the area devoted to cowpeas has gradually increased, and it has taken an increasingly important position among our cultivated crops. It is now distributed in nearly all the warmer parts of the State, though the production of seed is still largely confined to the North Coast District.

Preparation of Land and Seeding.

The land can be prepared in much the same way as for maize and other summer crops. Very early sowing is not to be recommended. It should be deferred till the soil is warm enough to germinate the seed rapidly, as otherwise it is likely to become mouldy and rot in the ground. As a rule the crop is sown in rows 2 feet 6 inches to 3 feet apart, and the seed from 6 to 9 inches apart in the rows. Such a practice enables the crop to be cultivated, which is an important factor in the production of seed, or when

grown in a dry district. It is also economical with seed—an important consideration when it is not a direct money crop, and every endeavour is being made to reduce expense.

The seed varies in size to such an extent that the accompanying list of varieties has been tabulated to give some idea of the comparisons:—

SEED TABLE.

No.	Name.	Colour, &c.	Drills 3 feet apart. Pounds of Seed: Plants 9¼ inches apart.	Drills 3 feet apart. Pounds of Seed: Plants 6¾ inches apart.
1	Black	Black, white hilum	7	10
2	Warren's Extra Early ..	Large, very light red	9½	13½
3	Wonderful	Dull brick red, elongate ...	5¾	8
4	Clay-coloured	Dull brick red	7	10
5	Whip-poor-Will	Speckled, liver colour	6¼	8½
6	White	White, black eye, white hilum	6¼	8½
7	Upright-growing	Small, pale brick red	2	2¾
8	Warren's New Hybrid ...	Angular, pale brick red ..	6	8¼
9	Iron	Light brown	5¾	8
10	Poona	Small, light brown	2	3

When broadcasted or sown with a wheat drill, using every run, considerably more seed is needed. There seems to be a strong tendency in America to broadcast thickly, whether sown alone or in a mixture with millets or sorghums. From 1 to 1½ bushels of seed are sown per acre, and this, especially with upright-growing varieties, greatly facilitates harvesting with a scythe or mowing machine. The seed drill, using the coarse runs, is undoubtedly the best machine for this purpose, as the seed is covered to an even depth. If, after broadcasting and merely harrowing in, heavy rain falls, a quantity of the seed may become exposed and does not germinate. Moreover, sowing wide enough to allow of cultivation may be performed with the same drill, by sowing only through certain drills and blocking up the rest. It must be remembered that, with seed at 15s. per bushel, thick sowing is going to considerably swell the cost of production.

Especially in cool districts, the young plants are slow to develop. The plant has, however, strong drought-resistant properties. Being a deep rooter it is not only enabled to resist drought, but is correspondingly valuable as a soil-renovating crop. Nodules are formed on the roots, as is the case with other legumes, and, whether the whole crop or merely the stubble is ploughed in, the nitrogen content of the soil is considerably increased. It is not infrequently found that the second and successive crops succeed better than the first, owing to the soil evidently being inoculated more thoroughly with the bacteria that carry out the fixation of atmospheric nitrogen.

Nitrogenous manures of any kind are rarely necessary. In manurial trials at this College phosphoric acid was proved to be undoubtedly the most important manurial ingredient. Sulphate of potash, though it increased the

Picking Cowpeas. Showing a convenient arrangement for holding the bag.

The Pea-huller being used for Shelling Cowpeas.

yields, was too expensive, while nitrogenous manures, especially nitrate of soda and sulphate of ammonia, were decidedly detrimental, reducing the yield by as much as 50 per cent. below the unmanured. In the trials referred to the sources of phosphorus in their order of efficiency were rock phosphate, Thomas' phosphate, bone-dust, and superphosphate. The last-named, though least effective of all, is nevertheless the one most easily procured by the average farmer. Dressings of about 1 cwt. per acre will in most cases considerably increase the yield.

Varieties.

There are a very large number of distinct types or varieties of cowpeas. Considering that in many cases the names of similar varieties vary according to the district, a full discussion of the question would hardly be profitable. Of the large number imported at different times from India, America, and other places, a few only are in general cultivation. Of these the Black is the most popular, while the Poona, a variety introduced from India, has rivalled the Black at this College. The following notes on a few of the more common may be of interest:—

White or Black Eye.—The seed of this variety is white with a black patch on the concave edge of the grain. It is a very early maturing variety, ripening pods in about three months. The growth is procumbent, but, as a rule, does not bear very heavy crops of either grain or green forage.

Upright Growing.—Like White, this is an early maturing variety and valuable on that account. The seed is clay coloured and very small, while the pods are of corresponding size. Growth is upright, which quality considerably facilitates harvesting.

Iron.—Is a fair producer of pulse and heavy producer of vine. The seed is a light brown or clay coloured, and the growth procumbent. It is a mid-season variety and in appearance closely resembles the Black. It is claimed that this variety is immune to the attacks of eel worms. This trouble, which is so frequently present in sandy soils, is common amongst the cowpeas of the College. The damage done here is never extensive, and we have not yet been able to prove the immunity of this variety.

Black.—This, which is no doubt the best all-round variety, is distributed more widely than any of the others. It is late maturing and semi-recumbent to recumbent in its habit of growth, and gives heavy yields of both green stuff and pulse. The grain is large and black in colour, the pods from 7 to 8 inches long, and easy to pick. One of its chief qualities is the even ripening of the pods, which necessitates fewer pickings than do many of the other varieties.

Poona.—A very late-maturing variety, which does not mature its pods as evenly as the Black, but which equals, if it does not excel, it in the production of green fodder. It is a distinctly upright-growing variety, thereby facilitating harvesting and cultivation, till the pods begin to form and the vines fall and block up the path between the rows. The seed is light brown

and very small, the pods being only 4 inches long. This latter characteristic, together with the uneven ripening of the pods, will no doubt go against its general cultivation. At the same time it should be remembered that only a small quantity of seed is required to sow an acre.

As a Green Manure.

Cowpeas form a very valuable green-manure crop for orchard and general farm work. Their deep-rooting and nitrogen-fixing propensities especially adapt them for this purpose. A good deal of difficulty is experienced in ploughing the vines in, and the use of the mould-board plough, even with a good disc coulter, is only partially successful. It is the usual practice at the College to roll the crop first, and then, after running over it with a cornstalk chopper or disc cultivator, to plough it in with a single-furrow disc plough. The type used here is a Secretary disc with subsoiler attachment, and though the vines are not completely covered with the disc it is on the whole more satisfactory than the mould-board.

The crop should be ploughed soon after the pods are set. At a later stage than this, the stems become woody and are hard to deal with. If it is desired to collect some seed for the next year's planting, it would be more satisfactory to allow certain rows to mature all their seed, rather than allow the whole crop to mature to that stage when it is ready for the first picking.

Ploughing the crop under in this manner is sometimes a very wasteful practice. It has a very high feeding-value, and if the crop be fed off on the ground where it is grown, at least 50 to 75 per cent. of the manurial value will be returned, while the full feeding-value of the crop will also have been obtained.

The growth of such crops as maize, sorghum, and millets, with the cowpea, is a fairly common practice, and for this purpose sorghum and millet are the most satisfactory. Such a mixture not only forms a better mixed ration for stock, but to some extent at any rate the cowpea climbs the stems of the more erect plant and facilitates harvesting. There is a tendency to exaggerate the benefits to be derived from the latter factor. In our trials at the College it might be said that the system assisted very little in the harvesting, but that the total produce was somewhat increased, and that the resulting fodder was better balanced.

A system that has proved very profitable on the North Coast is to sow the cowpeas down between the rows of early corn. They are sown with a maize dropper immediately after the last cultivation of the corn, which should not be later than January, if it is intended to harvest the cowpeas for seed. Yields of 10 bushels per acre are quite common, and as high as 16 bushels per acre have been gathered by this method. It forms a valuable adjunct to the maize crop and manures the land at the same time.

Cowpeas by themselves usually form an inferior sample of silage, often acid in character, and poor in colour and smell, and more or less decomposed. They are much better when mixed with sorghum, maize, or millets, which

can be done at the silo. American experience indicates that the best plan when sowing together is to broadcast the cowpeas at 1 bushel per acre, and the sorghum or kaffir corn at about 10 lb. of seed per acre.

Undoubtedly the best plan of utilising the green crop is by feeding it off. If it has to be cut and fed to stock either as green feed or as hay, a marked difficulty is met with, inasmuch as there is really no satisfactorily rapid method of harvesting. Machinery for this purpose has from time to time been placed on the market, but we have not yet obtained any implement that can be recommended.

The upright growing varieties, such as Poona and Upright-growing, especially when grown thickly, can be harvested with a scythe and sometimes with a mower.

The cowpea will make good hay, but not only is it difficult to harvest, but also very difficult to handle. The leaves fall very readily when dry, and the greatest care has to be exercised or the loss will be considerable.

Growing for Seed.

One drawback to any extensive cultivation of this crop for seed is the difficulty attending the harvesting of the pods. No machinery for this purpose has been perfected, and with present methods, the whole plant has to be harvested, and threshed, or the pods picked by hand. Men and boys with baskets, or sugar-bags attached to the waist, go through the crop picking the pods. Mr. George Morrison, of Chatsworth Island, informs me that he pays the pickers at the rate of 5s. per cwt. for peas in the pod, and that in a good crop they can earn from 7s. to 10s. per day. Three cwt. of these peas in the pod give, when threshed, one bag of peas weighing 240 lb.

Before threshing the pods are allowed to dry thoroughly, when the hull becomes brittle, and the seed separates quite easily. For small lots, a bag can be half filled with pods, and after tying up the mouth, threshed with a flail in the ordinary way. This saves the seed from being shattered, but is not so quick as threshing them loose on large sheets.

Pea hullers can be obtained on the market, but they seem to be only partially successful, as is the case with the one in use at this College, their chief objection being the cracking of the grain.

The Colonial Sugar Refining Company pays 10s. per bushel for cowpeas on the Rivers, while seedsmen will pay about 12s. 6d. per bushel delivered in Sydney. The average retail price for cowpea seed is about 15s. per bushel. These prices, together with the cost of picking, refer to the Black cowpea. The price of Poona, for example, which has very small seed, is usually something over £1 per bushel. These prices have altered very little during the last twenty years, and there seems every prospect of their being maintained at the present level.

Field Experiments with Wheat, 1913.

HAWKESBURY AGRICULTURAL COLLEGE.

VARIETY TRIAL FOR HAY.

R. W. McDIARMID, Experimentalist.*

The Experiments Supervision Committee, under whose control these experiments are being conducted, wish to draw the attention of farmers to the fact that final conclusions cannot yet be drawn from these trials, as they have only been conducted for a few years. Later, when results for, say, five years are available, a summary will be prepared, as sufficient evidence should then be available to enable conclusions to be formed. Meanwhile it is felt that the public are entitled to know the results obtained each year.

THE variety trial for hay, conducted in the Glebe No. 2 paddock, occupied section F of block F.

This block carried a crop of rape in 1912, manured with 1 cwt. of superphosphate per acre. The land was ploughed in September, 1912, and allowed to lie fallow until 1913, when the varieties of wheat were sown without manure.

Sowing took place prior to the heavy autumn rains. Of the late maturing varieties, Zealand and John Brown came out on top, giving a yield of hay of over 4 tons per acre; Cleveland, a variety of about the same season as Zealand, however, did not do nearly so well, as it only yielded slightly under 3 tons per acre.

Of the early maturing varieties, Firbank and Thew did best, but Bunyip appears to be a variety not suited for this district at all, as its yield was only 1 ton 12 cwt. per acre. This, however, was to be expected, as it may be said that Bunyip is essentially a variety suited to the drier climates in the wheat-growing areas.

Warren and Florence upheld their reputation, as the yield from these varieties was over 3 tons of hay per acre.

TABLE showing results of Experiment I, Wheat Variety Trial for Hay.

Date sown, 30th April, 1913; seed, 75 lb. per acre; area of plots, ⅛ acre.

Plot No.	Variety.	Yield per Acre. t.	c.	qr.	lb.	Percentage.
1. (*check*)	Warren	2	5	3	4	100
2.	Bunyip	1	12	1	4	63·13
3.	Fairbank	3	2	2	0	110·63
4. (*check*)	Warren	3	1	3	11	100
5.	Florence	3	0	3	4	99·93
6.	Thew	3	1	2	8	102·96
7. (*check*)	Warren	2	18	3	4	100
8.	Cedar	2	18	1	20	94·96
9.	John Brown	4	1	2	8	126·83
10. (*check*)	Warren	3	7	0	0	100
11.	Zealand	4	2	1	12	128·45
12.	Cleveland	2	19	3	12	97·74
13. (*check*)	Warren	2	18	1	12	100

Average yield of check plots, 2 tons 18 cwt. 1 qr. 12 lb.

* Now Assistant-Inspector of Agriculture.

Common Salt as a Poison for Stock.

F. B. GUTHRIE.

ALTHOUGH a certain amount of salt is a necessary adjunct to the food both of human beings and of animals, certain kinds of animals are susceptible to it when supplied in excessive quantities.

In the case of pigs and sheep, 4 to 8 ounces is said to have produced poisoning. (See Lander, "Veterinary Toxicology," 1912.) In larger quantities it has proved fatal to horses, and even to cattle. Fowls would appear to be particularly susceptible. Suffran (see Lander) has conducted experiments with fowls, and finds that 4 grammes per kilo body-weight (about 80 grains for each pound body-weight) are fatal if injected in solution into the crop. Several instances have recently been brought under the notice of the Department in which the deaths of poultry and pigs have been traced to an excessive amount of salt in the food. Quite recently the body of a fowl which had died suddenly was forwarded to the Department. On examination the organs were found to be healthy, and little abnormality was noticed except that the veins in the neighbourhood of the throat were suffused, and there was a slimy exudation in the mouth, resembling the appearance seen in croup. The crop was distended and the contents, which weighed 50 grammes, were apparently of the usual nature, consisting of grains of wheat, straw, plant residues, and pollard or bread.

On examination it was found that the 50 grammes of crop contents contained 2·42 grammes of common salt, or 4·84 per cent.

About a year ago several cases of sudden deaths among poultry were reported, which were traced to their having been given pollard which was highly impregnated with salt.

Several samples of pollard were sent for examination, which contained excessive and varying amounts of salt. One sample contained no less than 32·2 per cent. by weight of common salt. In this case salt crystals were easily noticeable, and could be picked out by hand or separated by blowing away the pollard.

Other samples contained varying amounts, down to 5·8 per cent. salt. In all these cases fatal effects had resulted, for which no other cause could be given except the presence of excessive amount of salt.

In another instance a case of poisoning of pigs was reported, which remained unexplained until the food supplied was examined. The food complained of was a mixture of pollard and barley-meal. A tin of the mixture showed 11·66 per cent. common salt. On separating the pollard from the barley-meal, the former was found to contain 18·3 per cent. salt.

The source of this pollard was never satisfactorily explained. Whether by accident or intentionally, there appears to have been at the time a considerable amount of this salted pollard on the market. It appears to

have disappeared by now, and isolated instances, like the first one reported in this article, are due to the accidental admixture of salt with the food.

The toxic effect of salt appears to be due to its action on the muscles, so that the animal becomes unable to walk and, finally, to stand. Death is caused by asphyxia, due to loss of power in the respiratory muscles.

It is hoped that the publication of the above notes may serve to keep stock-owners, and especially poultry breeders and pig-raisers on their guard against the danger of too great an admixture of common salt in the food.

"Hard Federation."

In consequence of the variations from ordinary type exhibited by the strain of Federation wheat now being grown at Cowra Experiment Farm, it has been deemed advisable to apply a distinct name to it, and "Hard Federation" has been selected as the most appropriate.

The difference between ordinary Federation and that grown at Cowra Experiment Farm, and supplied to farmers for the last year or two for seed purposes, were observed by a number of wheat-growers in certain districts last harvest. Much interest was aroused by the occurrence of a number of white heads in the midst of the crop, sometimes giving it an almost piebald appearance. The grain was observed, too, to be of harder and more horny character than usual, and the new strain was soon known as "New Federation," "Improved Federation," etc., though the Department had not then adopted any distinctive name. The Cowra strain of Federation, however, presents quite sufficient variation to justify distinction from the variety from which it has sprung, and it may even prove that its undoubted advantage in flour strength may have an important influence upon the industry in New South Wales.

The departure from type was first noticed by Mr. J. T. Pridham, Plant Breeder, in 1907 or 1908, one of the plants selected from the stud plots being observed to thresh grain of remarkably hard and flinty appearance. The plant had the distinctive brown head and general appearance of Federation in the field, but the grain was of a class that had never been seen in this variety before. The seed was propagated, and in 1910 the occurrence of white heads was noticed, and from then till 1912 distinctly white heads were common among the brown, but in 1913 there were no white-eared plants, and it is hoped that the seed will now be true to type.

"Hard Federation" presents the main characteristics of Federation, though the spikelets are rather more widely spaced, and the straw not quite so strong. There can be no question, however, about its superiority for flour production over the softer-grained Federation.

A recent description furnished by Mr. Pridham includes the following:—"The ordinary Federation has an opaque yellow grain with a floury fracture, and the strain grown at Cowra Farm, and now in the hands of a number of western farmers, has a transparent yellow grain with a rather horny fracture. The latter matures earlier than the ordinary type. A good sample gives a flour strength of 52, and the soft grain 48."

Lucerne Hay and Chaff.

THEIR MAKING, HANDLING, AND MARKETING.

F. DITZELL, Assistant Inspector of Agriculture.*

As the above title indicates, this paper deals only with the making, handling, and marketing of lucerne hay and chaff, and no attempt is made to deal with any of the cultural operations required to actually produce the crop fit for cutting for hay, or with the lucerne seed crop. These have already been fully dealt with in *Farmers' Bulletin*, No. 37, entitled "Lucerne," and published by the Department of Agriculture, which may be obtained free upon application to the Under Secretary.

Every care should be exercised in the cutting, curing, storing, and preparation for market of lucerne hay and chaff, so as to produce a product capable of commanding the highest prices in the markets. Lucerne hay is more difficult to cure than wheaten or oaten hay, and improper methods soon result in loss. Bright, dry, green, leafy hay, free from grass, weeds, and other rubbish, and carefully and attractively baled, commands the highest prices, as also does prime, dry, green, well-cut chaff, in which the leaf has not been powdered during the operation of chaff-cutting. There should be no sign of heating in either the hay or chaff after baling or cutting, as heated produce soon deteriorates, and is not liked by the buyers, especially those buying to store for a while. Attractive appearance is of great importance, as hay is largely purchased upon outside appearance.

When to Cut for Hay.

Lucerne should be cut for hay when it begins to flower. It is more necessary to select the right time for cutting this crop than is the case with other hay crops. It has been proved that the lucerne hay has a higher feeding value when cut at an early stage of maturity, about one-tenth in bloom, than when cut in full bloom, and greater weight is also usually obtained.

The leaves of lucerne are much richer in protein, which is the valuable nitrogenous material in the plant so necessary for the development of muscles, tendons, nerves, and various tissues, than the stems. The leaves wither and drop off, and shatter worse in cutting and curing if the plants are allowed to become too mature before harvesting, thus resulting in loss of the most valuable portion of the plant. It is of great importance that the leaves should always be retained in the hay, and this is favoured by cutting the crop soon after it commences to bloom. After flowering, the nutriment in the stems and leaves is gradually transferred to the flowers and pods of the plant, and the stems harden and become indigestible, less palatable, and of less value for food. Digestibility and palatability are essential requisites of good hay and chaff.

* The author desires to acknowledge the kindly assistance given by Mr. J. O'Neill, of Messrs. John See & Co., 214, Sussex-street, Sydney, in the preparation of this paper.

Again, when a crop is cut at the beginning of the blooming period, the next crop, when soil and weather conditions are favourable, starts quickly, and there is no delay in growth. As lucerne approaches maturity, the young shoots start again from the crowns of the plants, and if the crop is not harvested until it is in full bloom, or past full bloom, these young shoots are cut off, thus checking the growth of the lucerne, and delaying the harvesting of the next cut.

By taking due care to always cut when the crop starts to bloom, it is possible to secure an extra cut during the season, above what would be secured if the cuttings were made at a later stage in the growth of the crop. This means an actual gain of from 15 cwt. to 1 ton of hay per acre per annum. When the crop is harvested at too late a stage, loss is occasioned through the longer time the crop occupies the land.

The only justification for not cutting for hay in the stage of growth recommended is when delays are caused on account of unfavourable weather, or when the spring and autumn cuts are being harvested. The treatment of these spring and autumn cuts is dealt with later.

In large paddocks, the last part of the crop to be harvested will be in a more advanced state of maturity than the first, but this difficulty can usually be overcome by cutting these paddocks in blocks in rotation.

The first, or spring cut, and the last, or autumn cut, of lucerne, on account of the cooler weather then prevailing, are often fit to cut for hay before they flower, and when cool and moist weather is experienced, especially in the cooler districts, some of the other cuts may also be ready to cut before they flower. In these cases the lower leaves should be watched, and as soon as they begin to turn yellow the crop should be cut. After the lower leaves turn colour and commence to fall, the stems tend to harden, and the young shoots may then be observed springing from the crown.

Cutting Frosted Lucerne.

A young stand of lucerne is occasionally killed right out as a result of severe winter and spring frosts; or sometimes a severe late spring frost injures the top of the lucerne plants in older stands, killing the stems back several inches from the top. Where this occurs, the crop should be cut at once, even if it is only half matured, because the new growth will start more quickly from the newly-cut plants than from the stems of the frosted plants. Also, the frosted lucerne, if it is not cut and removed from the field, will injure the appearance and quality of the next hay crop. The autumn cut, in the cooler districts especially, is very often injured by early winter frosts, and when thus affected it should be cut at once. The drying effect of frosty weather is often of great assistance in curing the autumn cut.

Percentage of Leaves to Stems.

Good quality lucerne hay will contain on an average about 55 per cent. by weight of stems, and 45 per cent. of leaves. Different types of plants will vary considerably in the relative percentages of leaves and stems.

The Effect of Sun and Wind in Curing.

Favourable weather is of the utmost importance in the making of good hay. Excessive rains while the hay is being cured will injure its quality and feeding value, while showery or cloudy weather renders curing difficult, and hay of the best quality cannot be made. While every farmer knows how rain and dew cause hay to bleach and mould, thus lacking in the natural aroma and palatability so essential to hay of good quality, all are not aware that hay that is exposed too much to the sun not only bleaches and loses leaves by becoming dry, but also loses in palatability, and often in weight.

During the process of curing, hay should not be exposed to the sun any more than is absolutely necessary. The aim should be to effect curing as far as possible through the action of air and wind, as hay cured in this way retains its natural aroma and other good qualities which make it nutritious and palatable to stock.

The best hay is therefore made by curing largely in cocks rather than in the swath or windrow. Hay in the swath or windrow is also more exposed to injury by rain or dew than hay in the cock. On account of the shattering of the leaves, and the greater tendency to bleach, the loss in curing lucerne hay in the swath and windrow is greater than curing wheaten or oaten hay under similar conditions.

The aim should always be to produce the best quality of hay which will readily command top prices in the markets, and is also of the best value for feeding on the farm, where so required.

Raking and Cocking.

Hay cures more evenly and thoroughly in the cock than in the swath or windrow. When the hay is exposed to the sun too long in the swath, the leaves may become thoroughly dry, so that they will readily shatter in raking and cocking, while the stems may still contain a large quantity of moisture. Such hay will not cure fully and evenly, and is often stacked in a partly-cured condition. If hay is raked and cocked before the leaves are dry, the leaves continue to pump water out of the stems, thus allowing the hay to cure fully and evenly, and hay cured in such a manner will keep perfectly in the stack, without any heating or charring.

Windrow Curing.

The method described above of curing hay in cocks is really essential where hay is being prepared for market. The value of the product makes it so. However, on larger lucerne fields inland, where lucerne is sown primarily as a grazing crop, and only one or two cuts of hay are taken off during the season, when a sufficiently good growth for the purpose is produced as a result of a favourable season, and then is intended generally for consumption on the farm or station during times of scarcity of natural feed, it is almost necessary to have a more inexpensive way of handling the lucerne hay crop. This would also apply to a more limited extent to large areas producing only a medium-quality lucerne hay.

In these circumstances the hay may be cured in the swath and windrow, or in loose bunches made by running the horse-rake along the windrows. Side delivery rakes may be used for putting the hay into windrows. This is a rapid and economical way where there is a large area to deal with, and only a limited amount of labour is available. A large area of lucerne can also be harvested while in the best condition to make hay.

In many of the drier States of the United States of America, where large quantities of lucerne hay are produced for stock feed, this method of windrow curing is in vogue, and the methods of stacking adopted are to load direct from the windrow to the waggon by means of the hay loader, which makes the work more rapid, and does away with the labour of pitching the hay; or to use sweep rakes, by which the hay is taken directly from the windrow to the swinging stacker, and stacked in the open.

Hay loading Machinery.

Side delivery rakes and hay loaders, or sweep rakes and swinging stackers, are not used to any extent in New South Wales. Their use may be advisable on the larger fields inland, where a grower desires to get a hay cut for home consumption mainly once or twice in the season, and where the conditions for hay making are often ideal, *i.e.*, hot and dry, but they are hardly to be recommended for use in our lucerne hay-raising districts, where good quality hay for the Sydney market is produced. The risk from damage by rain or dew while in the swath or windrow in these districts would be greater than in those just mentioned, and on account of more uneven curing in the windrow and the handling in machine loading, there would also be a greater loss of leaf by shattering.

Mr. C. Kelly, of Piallamore, Tamworth, uses two side delivery rakes and two hay loaders for handling his lucerne crop, and speaks highly of them. He finds that they cut his labour expenses in half, and enable him to deal with a large area expeditiously. These machines last year dealt with 350 acres of lucerne, and Mr. Kelly considers that from 400 to 500 acres could be dealt with by them. Unfortunately, none of this hay has been sold in the open market, so comparisons cannot be drawn between the value of this hay and other hay produced in the district. If the hay is dry it is generally carted in during the morning, while it is rather tough, to avoid shattering of the leaves.

The approximate cash price in Sydney of a side delivery rake is £26, and of a hay loader £34. The sweep rakes cost £11 each, and the swinging hay stackers £22.

To sum up *re* the use of these machines: There is no doubt about their advantages from a labour-saving point of view, and their capacity to deal expeditiously with large areas; but the objection to their use, especially in districts capable of producing good quality hay, is that it is not possible to make such good hay as by the ordinary method of curing in cocks. This is the sum total of American experience with these machines, and it is in America they are manufactured; while it has yet to be proved in Australia that hay made in this manner can hold its own on the markets against hay made in the usual way.

The Best Method of Curing Lucerne Hay.

The crop should be cut when in the right stage of growth, and when there is a prospect of fine weather ahead until the hay is in the stack. As soon as any dew which may be present in the morning is off the crop, the mower may be started. If dew or light rain should fall on the crop in the swath immediately after cutting, it will not do any harm. After the cut crop has wilted somewhat, but before the leaves become dry and brittle, it should be raked into windrows. A practical guide is to rake as soon as the lucerne feels crisp underfoot. The exact time to follow with the rake is dependent upon weather conditions. If the weather is very hot and dry the rake can almost immediately follow the mower, while if it be cool and dull, the crop may be allowed to remain in the swath for a day or more before raking into windrows. If the plan is to cure in the windrow, the hay will be ready for stacking in from one day of very good curing weather up to three or four or more days of cool or cloudy weather. If the plan of curing in cocks is to be followed, the hay should be placed into cocks after it has dried for a while in the windrows, but before it has dried so far that the fork will knock the leaves off. In very hot or dry weather the crop can be cocked almost immediately, while if the weather be cool and dull, the crop may be allowed to remain in the windrows for a day or two before cocking. The cocks should be made narrow and high rather than broad and flat, and should be larger when the weather is hot and dry than when it is cooler and dull, or when a leafy, sappy crop is being handled. They are usually built by building one forkful over another, and turning each forkful as it is put on. If the bottoms of the cocks are inclined to be damp when the remainder is nearly fit for carting in, the cocks should be turned, and the bottoms exposed to the sun, when they will soon be ready for carting in. In from one day in good hay-making weather up to three or four or more days in cool or cloudy weather, the hay will be fit for carting in.

Hay is more apt to be injured by external than by internal moisture, and therefore this should be an invariable rule that hay should not be raked, cocked, or stacked when there is moisture on it either from dew or rain, as such hay is likely to mould in the cock, and is very apt to heat or blacken or burn in the stack.

Hay Caps.

In some of the moister regions of the United States of America, where the method of farming is becoming intensive, rather than extensive, hay caps are used to a certain extent to protect lucerne hay in the field by covering the cocks with canvas or paper caps manufactured specially for the purpose. This practice is not likely to prove of much practical value in this country.

The Use of the Reaper and Binder.

Mr. G. M. McKeown, the manager of the Wagga Experiment Farm, considers that harvesting with the reaper and binder is the most economical method of cutting when the growth is tall enough, provided the weather is very hot and dry. The sheaves are then placed in long stooks two deep, and

in good hay-making weather the hay will be fit for carting to the stack in four or five days. Naturally, lucerne in sheaves will not cure as readily as in the usual method of curing. It is claimed that this method keeps the hay free from dirt, that the colour is better, and that there is less loss of foliage. However, it can only be recommended for very dry districts.

When to Cart in the Hay.

Hay is fit to cart in when the stems have lost their sappiness, and the hay has a rather crisp, instead of a damp feel. Hay dries from the base upwards, that portion of the stem near the tip being the last to dry. If the stems are sappy and moist, and exude moisture upon being twisted, the hay should not be stacked. It is the stems that want watching; the leaves will always be dry enough if the stems are. Practical experience will soon enable a person to determine the correct stage in which to cart in.

The directions given beforehand about the stage in which to rake, cock, and cart in the hay are made as explicit as possible, but practical experience is absolutely necessary in this as in most other things. The main point for a beginner to grasp is that it is the stage of dryness the lucerne is in that decides the time for each operation, and not that a certain time has to elapse between each operation, for the time is entirely dependent upon weather conditions.

Green and Brown Lucerne Hay.

Dry, green hay is usually made in this State, and is obtained by carting in at the stage described above. If the hay is stacked while containing slightly too much moisture, brown hay will be produced as a result of the fermentative and other changes which take place in the stack. Brown hay is more succulent and freer from dust than green hay, and is well liked by stock; but it is not largely made, on account of the greater risk of loss by heating, charring, or firing, and also because when it is placed on the market it does not command such high prices as the prime dry green. Where required for home consumption brown hay is just as good as, if not better than, green hay. Generally speaking, the hay is carted in one day earlier when making brown hay than when making green hay. Instead of the rather crisp feel required for the production of green hay, there should be a slight dampness, but when the stems are twisted, no moisture should exude. If the hay be carted in while there is too much moisture present, the hay is liable to charring, or even spontaneous combustion through the heat generated.

The spring cut of lucerne is usually very sappy, and the weather is then not always suitable for hay making, so that this cut is often made into brown hay. At other times, when the weather conditions are not suitable for the making of green hay, brown hay is often made, often more because it cannot very well be avoided than because it is desired. When hay has been exposed to the weather long enough to become bleached, the making of brown hay will disguise this defect.

Method of Stacking.

Hay should preferably be stored in sheds. Lucerne hay does not shed rain as well as wheaten hay, which is often stacked in the open with little loss. When the hay is stacked in a shed, it is not exposed to the weather when it is opened up for baling or feeding.

When the hay is to be fed on the farm, it should be stacked in a convenient place, so as to avoid any unnecessary handling and shedding of the leaves when feeding.

The usual way of stacking is to load on to waggons and cart to the shed or stack, and fork off.

In the United States of America, slings are often used in preference to pitchforks for unloading. They are said to be cleaner, and more rapid in their work. Where sweep rakes are used for bringing the hay in directly from the windrows, sweep stackers or swinging stackers are used, and the hay is stacked directly in the paddock adjacent to the lucerne field.

Hay should not be stacked on the ground, but always on a straddle of poles, or timber of some kind. This straddle prevents the hay on the bottom of the stack from spoiling, by becoming mouldy where the ground may be damp; and by providing an air space beneath the stack, and thus giving better ventilation, it prevents any heating near the bottom.

When stacking in the open, the middle should always be kept full, so that when the hay settles the slope will be outwards towards the edges of the stack, in order to shed rain. The stacks should then be protected from the weather either by thatching or covering with tarpaulins, or, preferably, galvanized iron.

Spontaneous Combustion.

Although the causes leading to spontaneous combustion are not thoroughly understood, yet it is well known that the main cause is through stacking hay which contains too much moisture either as a result of the crop being a very sappy one, and thorough curing not having taken place, or as a result of extreme moisture either from rain or dew. The spring crop, when weather conditions are bad for drying, is the most likely to give rise to spontaneous combustion or charring. The degree of damage done varies according to the temperature reached. While a very high temperature is required to give rise to actual firing, yet lower temperatures will cause charring or heating, which injure the quality of the hay. When the hay is badly charred it is practically valueless, and when actual firing takes place it is reduced to ashes. When a grower is stacking hay which he thinks may fire, it is a wise plan to stack away from sheds or stacks, so that in the event of actual firing occurring this hay only will be lost.

Lucerne Silage.

Where the conditions, as a result of a wet season, are too moist for the proper curing of the spring, or any other cut, the lucerne crop may, if desired, be converted into silage. For this purpose the crop should be cut as soon as it commences to flower, or is in the right stage for cutting for hay, while it is green and succulent, and should be raked directly behind the

mower and hauled to the silo, pit, or stack as the case may be, as quickly as possible. The big advantage of converting lucerne into silage in a wet season is that it may be cut and ensiled while wet with rain or dew, and will make good silage. Silage is an excellent feed for dairy cattle, lambing ewes, &c. Any very weedy cut of lucerne may also be treated in this manner.

Shrinkage in Weight of Hay.

When green lucerne is cut for hay, its moisture content will vary somewhat, according to the dryness of the season and the maturity of the lucerne when cut, but the average will vary between 75 and 80 per cent.

When the hay-making weather is favourable, the cut lucerne soon loses some of its moisture, and when well wilted will contain from 40 to 50 per cent. of moisture. When fit for carting in, the hay will contain between 16 and 24 per cent. of moisture. Fully air-dried hay taken from the stack should contain from 10 to 12 per cent. of moisture.

The loss of weight in hay after it has been stacked varies, but will range between 10 and 20 per cent., and there is also a further slight loss after baling each bale of lucerne, especially in hot, dry weather. Owing to the amount of moisture in lucerne hay or chaff, they often lose weight in transit. Well-made lucerne hay should keep for years.

Rules for Measuring Hay.

These vary in accordance with the length of time the hay has been stacked, the quality of the hay, and the type of stack. Usually an 8-feet cube (or 512 cubic feet) is allowed per ton for hay that has been stacked one month, and this is reduced to a 7½-feet cube, or 422 cubic feet per ton, when the hay has been stacked for five or six months. For old, fully-settled stacks, it is usual to allow a 7-feet cube, or 343 cubic feet per ton.

The multiplication together of the length, width, and height of a rectangular or square stack will give the volume. The following rules for stack measurement are in use in the United States.

With a long stack throw a line over the stack and measure the distance in feet from the bottom of one side of the stack to the bottom of the other side of the stack; to this add the average width of the stack in feet, divide this sum by 4 (which gives one side of the square), and multiply the quotient by itself, and this product by the length of the stack in feet. The result will be the volume of the stack in cubic feet, and this divided by 512, 422, or 343, as the case may be, will give the number of tons in the stack.

For small, low stacks subtract the width from the "over," divide by 2 (which will give the average height of the stack), multiply by the width, and multiply the product by the length, dividing the result by the number of cubic feet allowed per ton.

Round stacks are not so easily measured. This is one rule which is given for the ordinary conical stack. Find the circumference at or above the "bulge" at a height that will average the base from there to the ground; find the vertical height of the measured circumference from the ground and the slant height from the measured circumference to the top of the stack, taking all these measurements in feet. Multiply the circumference by itself, and divide by 100, and multiply by 8, then multiply the result by the height of the base, plus one-third of the slant height of top. The result will be the volume of the stack in cubic feet. The hay in a round stack is usually less compact than in a rectangular stack, hence a greater number of cubic feet should be allowed for a ton, with even well-settled hay, probably 512 cubic feet per ton.

Baling.

Lucerne hay has to be baled for transport to market. Baling is sometimes done direct from the field, or very soon after stacking, but the practice is not a good one. After the hay is stacked, it continues to sweat and mellow. When hay that has not had time to sweat is put into tightly-compressed bales, rapid heating is often induced, and any suspicion of heat will cause buyers to reject the hay. Some growers use a quantity of water when baling, but this procedure is not to the advantage of the purchaser, as very often the insides of the bales so watered become musty, and a grower often loses a good name.

Hand *v.* Machine-pressed Lucerne.

The bulk of the lucerne hay in bales sent to the Sydney goods shed and Sussex-street markets is hand-pressed, and by far exceeds the quantity of derrick or machine pressed lucerne. The reason of this is that the hand-pressed lucerne brings the highest prices, the derrick-pressed lucerne not being in favour with retailers. When pressed direct from the field the leaf, which must be dry before the hay is fit for carting in or pressing, is powdered more or less during the process of machine pressing, while the stems, which always contain a certain amount of moisture when the hay is fit for carting in or pressing, give rise to a certain amount of heating in the bale, which often gives rise to what is generally known as "white must," or to a more severe form of heating, in which the hay is likely to set into a hard mass, thus detracting from its value. Where lucerne is stacked and allowed to nicely mellow in the stack before pressing, the stems will not give rise to any heating in the machine-pressed bale, but the same objection to the twisting of the stems and the powdering of the leaf still applies. Where such lucerne is neatly cut out in benches and hand pressed, it will always open up nicely, and may be lifted off in layers with the leaf intact. Again, the appearance of the machine-pressed bales is not so attractive as the hand-pressed bales from the point of view of buyers.

The Size of Bales.

Good quality fine hay is best put up for market in small bales, or bundles, as they are termed, of from 1½ to 2½ cwt. in weight. Generally, the finer the stalk, and the greater the percentage of leaf to stalk, the greater the weight. Brown hay also weighs heavier than green hay. Several small bale-presses on the market are suitable for the making of bales from 1½ to 2½ cwt., a usual size being about 4 feet x 18 inches x 3 feet. A press of this description weighs about a ton, and costs about £30.

Small bales should be tightly pressed, and bound with three wire bands. The size of wire used is usually No. 10 black, an economical gauge, for small or light bales, and No. 8 for heavy bales. The reason for three wire bands is that they keep the bale very compact, and save bursting, and thereby loss in weight; also, as the bulk of the choice grade hay put up in this size of bale is used for horse consumption, and many retailers oblige their customers by sawing the bales into halves or thirds, the fact of the three wires being on the bale saves it from falling apart when so cut. This

class of bale is also acceptable for export and for feeding to stock on voyages, as it is easily handled.

Ordinary quality lucerne hay is best sent to market in the ordinary size of bale weighing from 4 to 5 cwt. This class of bale usually goes to the dairymen, and in drought time especially is in large demand.

Lucerne hay is generally baled by contract. In the Tamworth district the usual contract rates are 10s. per ton for ordinary, and 12s. per ton for small bales.

All the bales should be well trimmed up to add to their attractiveness, and the trimmings from each bale can be placed in the following bale.

The hay is loaded for market into 6-ton or larger trucks. The small bales of from 1½ to 2½ cwt. run from 60 to 80 per 6-ton truck; the medium-sizes bales of about 4 cwt. run from 32 to 33 to the same truck; while the larger bales of 5 cwt. go a correspondingly smaller number to the truck.

Battens.

Some time ago there was considerable discussion between buyers and sellers over the size and weight of battens used on bales. Buyers do not object to battens of a reasonable size, but they do object to their being unnecessarily large and heavy. It is to the grower's interest to bale his hay in a manner attractive to buyers. Some growers, in the Mudgee district mainly, split small willow branches, and in every way possible try to meet the buyers' requirements and when a grower obtains a good name on the market, buyers always give him preference.

The Relative Demand for Lucerne Hay and Chaff.

It is difficult to state the proportion of hay and chaff forwarded to the Sydney markets, as no records are kept, but it would probably be in the proportion of about 10 to 1. There is a steady demand for choice green lucerne chaff, and for this grade there is a threefold demand, namely, for horses, cattle, and poultry. The competition of the poultry-men often enables sellers to realise extremely high rates, but the chaff must be green, sound, and leafy. Dairymen generally prefer lucerne in bales, as it then keeps better, and for a longer time. The relative values of hay and chaff depend purely upon supply and demand, and also on the time of the year, the demand for poultry purposes being greater at some periods than others. In the Tamworth district, roughly, about one-third of the lucerne hay produced is marketed in the form of chaff.

Lucerne Chaff.

The best quality lucerne chaff is cut from prime, green hay, fine in the stem, and not too dry, but only in a few cases is such good quality hay chaffed. The bulk of hay chaffed is only of medium quality, the class it really pays best to chaff being that which is very coarse in the stem. It is then more easily consumed by stock.

Lucerne chaff should be free from dust and impurities. When chaffing, a stamper bagger is used, as it does not powder the leaf so much as a screw

bagger. In order to produce chaff of good quality, the hay should not be too dry while being chaffed, but should be steamed or damped as necessary, or else chaffed on a damp day. The knives should be kept sharp, and properly set against the face-plate, so as to cut cleanly, instead of breaking and bruising. The feed-box should always be kept uniformly full. Sound bags, but not necessarily new ones, should be used for the bagging of the chaff, as such add to the attractiveness. Average quality chaff will run about twenty-eight bags (new) to the ton. The contract rate for chaff-cutting is usually about 12s. 6d. per ton.

Mr. J. J. Lord, a well-known lucerne grower at Nemingha, Tamworth, prefers to chaff a large proportion of his hay. He says that chaff-cutting provides better employment for his men, especially on wet days, or between the various cuts, and also enables quicker advantage to be taken of a rising market, because where two trucks a day can be chaffed with the one machine, it would be good pressing to press one truck in two or three days. In fact, he would sooner dispense with his press than with his chaffcutter. It is only fair to mention that Mr. Lord's lucerne is generally of vigorous growth, and fairly thick in the stem, or in other words, is the type of lucerne it pays to chaff.

Lucerne Dust.

This is usually obtained as a residue from chaff-cutting, especially when the hay is very dry, and to a more limited extent from threshing for seed. It is of commercial value, being purchased chiefly by poultry-farmers. At times it realises very high prices. A bright, green colour is preferred. Some growers are adopting a bad practice of putting dirt in with lucerne dust, and buyers object very strongly to this. In fact, some authorities strongly condemn the use of lucerne dust unless it be of a high grade. Growers, in their own interest, should not allow a mixture of deleterious substances.

Marketing Charges.

After the hay has been baled or chaffed, the marketing charges are:—Cartage to the railway station or siding; freight, which between Tamworth and Sydney, 282 miles, amounts to about 10s. per ton; commission, which is at the rate of 5 per cent.; and weighing, reloading, and delivery charges, which amount to about 1s. per truck and 3s. 6d. per ton respectively.

New South Wales Lucerne Districts.

The three main districts in this State producing lucerne hay and chaff for market are Tamworth, the Hunter River, and Mudgee. Each of these produces choice hay, and at various times have beaten one another in the markets. Mudgee, on account of the handy-sized bales of from 1½ to 2 cwt. forwarded from there, and also because of the general good quality of the hay, which is fine in the stem and has a good proportion of leaf to stem, usually commands the best attention of buyers; but Northern-grown lucerne sometimes realises just as good values. Many parts of this district can produce hay of equal quality with Mudgee if the growers will only study the Sydney buyers' requirements. The general complaint of buyers against

some of the Northern consignments is the weight and size of the battens, some growers using too much wood. The Mudgee bales are usually sent forward with light battens, and in a number of instances light willow branches are used, and as the bales are always trimmed very neatly, they have an attractive appearance.

Other districts forwarding lucerne hay and chaff in smaller quantities to the Sydney markets are Muswellbrook, Scone, Canowindra, and Bathurst, while small lots are received from Bunyan, near Cooma, Yanco, and Hawkesbury River.

Hay from the Canowindra district in the past has not been made in a manner suitable for the Sydney market, but methods have improved considerably of late, and some of the consignments from there have been of very prime quality. Some of the hay forwarded this season (1913-14) was rather hard, due, no doubt, to being made in very hot weather. It is invariably sweet, and some prime lots of chaff have been marketed. As growers become more conversant with Sydney requirements, a higher grade of both hay and chaff will no doubt be forwarded.

Small lots of hay have been forwarded to Sydney from Yanco, but in most instances the quality has not been prime, and in a number of instances it has been badly made, and growers will have to exercise greater care in the baling. A few small lots of chaff have been forwarded, the quality of which has been prime, but the bulk has only been medium.

Stalky and Fine Lucerne.

The richest lands, especially when under irrigation, or where the roots have penetrated down to the moist ground above permanent water, are apt to produce a stalky growth, really only fit for chaffing. The quantity is produced, but the quality is sometimes not equal to that yielded by soils where the growth is dependent upon the natural rainfall. In the latter case the lucerne is finer in the stem, and the proportion of leaf to stem is greater.

Mazzaqua at Grafton Experiment Farm.

This plant, which is allied to the non-saccharine sorghums, was highly recommended in some quarters a few years ago. At the Grafton Experiment Farm it was grown for several years, but for the past two seasons its use has been discarded, as the manager considers it has been over-rated, and not nearly so good as the common sorghums. It is an extremely coarse-growing fodder, and not relished by stock unless chaffed. Mr. Haywood saw a sample of it at Maclean this year over 20 feet in height and the stems an inch in diameter. In his opinion there is nothing about it to recommend it.

A Descriptive Catalogue of the Scale Insects ("Coccidae") of Australia.

[Continued from page 610.]

WALTER W. FROGGATT, F.L.S., Government Entomologist.

Mytilaspis formosa, Maskell. (Pl. V, fig. 1.)

Trans. New Zealand Institute, vol. xxvi, p. 68, pl. iii, figs. 4–6. 1893.

TYPE specimens from Baron von Mueller probably came from West Australia upon the foliage of a Eucalypt; Renmark, South Australia, on *Eucalyptus corynocalyx* (French); and from Mudgee, New South Wales, on a Eucalypt.

Female puparia are clustered together in patches on the surface of the leaves. Snow white, with the first pellicle small, dull yellow, the second much larger and dark reddish yellow. General form elongate, broad to the extremity, where it broadens out at the apical margin, very convex. Length, $\frac{1}{12}$ inch.

Adult female dark orange, elongate, abdomen circular at extremity with small toothed projections, with two median lobes, with two spines between them and a smaller lobe on either side. Five groups of spinnerets; eight pairs of compound spinnerets with cylindrical tubes extending beyond the margin.

1393. *Lepidosaphes formosa.* Cat. Coccidæ, p. 309.

Mytilaspis fulleri, Cockerell.

Mytilaspis elongata, Fuller, *Trans. Ent. Soc.*, London, p. 69. 1899
Cockerell, new name 1902.

The type specimens come from near Perth, West Australia, upon the foliage of a Honeysuckle tree (*Banksia ilicifolia*).

Female puparium grey, very long and narrow. Length, 0·18 inch. Female coccid elongate. Pygidium broadly rounded, with six distinct lobes, the median pair wide, parallel, truncate and notched, spines small; circumgenital glands arranged in an unbroken horseshoe like band round the margin of the pygidium.

Cockerell altered the specific name to *fulleri* in 1902.

1394. *Lepidosaphes fulleri.* Cat. Coccidæ, p. 309.

Mytilaspis (*Aspidiotus*) *gloverii*, Packard.

Guide to the Study of Insects (Ed. 1), p. 527. 1869.
Comstock, *U.S. Report Dep. Agri.*, 1880, p. 323.
Maskell, *Trans. New Zealand Institute*, vol. xxiii, p. 8. 1890.

A cosmopolitan scale probably introduced in Australia from the United States, recorded from Victoria and New South Wales upon oranges. Comstock states that it is one of the two common species of the genus *Mytilaspis* in

the orange groves of Florida. Said to have been introduced from China in 1840 upon imported trees into Florida, from where it was taken west and spread into the orchards of California.

Female puparium very narrow, often almost straight, varying in colour from light yellow to dark brown; ventral scale white, consisting of two narrow parallel plates open down the centre.

The adult female light purple with the last segment yellowish, median lobes abruptly narrow, prolonged more or less into a point, hardly serrate. Five anterior groups of spinnerets, spines very small.

1395. *Lepidosaphes gloverii.* Cat. Coccidæ, p. 309.

Mytilaspis grandilobis, Maskell.

Trans. New Zealand Institute, vol. 25, p. 70, pl. iii, figs. 13–14. 1893.

This species was found upon the foliage of a Honeysuckle (*Banksia sp.*) near Melbourne, Victoria.

Female puparium white, elongated, and mussel-shaped or slightly pyriform, but often covered with white flocculent matter obscuring the outline of the scale. Length, about $\frac{1}{14}$ inch.

Male puparium semi-cylindrical, sides parallel, not carinated; length $\frac{1}{23}$ inch.

Adult female yellow, normal form, abdominal segments rather conspicuous; length about $\frac{1}{20}$ inch. Abdomen ending in a curve, with two large conical lobes rounded on tips, serrate on the sides; outer margin of abdomen serrate with spiny hairs; five groups of spinnerets, with many dorsal spinnerets.

1396. *Lepidosaphes grandilobis.* Cat. Coccidæ, p. 310.

Mytilaspis grisea, Maskell.

Trans. New Zealand Institute, vol. xxii, p. 133, pl. iv, fig. 1. 1889.

This species is found on both *Eucalyptus* and *Acacia*. Maskell records it from various localities in New South Wales, but gives no exact locality. I have never seen it, and append his description:—

"Female puparium light grey, narrowish, elongated, slightly curved convex, rather solid, about $\frac{1}{12}$ inch in length; mussel shaped; pellicles rather small.

"Male puparium similar but much smaller, averaging not more than $\frac{1}{14}$ inch; not carinated.

"Adult female dark red or nearly black, elongated. Abdomen with four small lobes, median pair largest, only a few spines on the edge; five groups of spinnerets."

1398. *Lepidosaphes grisea.* Cat. Coccidæ, p. 310.

Mytilaspis (Coccomytilus) hymenantheræ, Green.

Victorian Naturalist, vol. xxii, May, 1905, p. 5, fig. 6.

This species was collected at Myrniong, Victoria, upon the stems and twigs of *Hymenanthera banksii.*

Female puparium reddish brown, more or less covered with the fibres of the bark of its food-plant. Moderately curved, rather broadly dilated, expanding abruptly behind the first pellicle. Pellicles reddish; second pellicle completely concealed. Length, 25 to 30 mm.

Adult female oblong oval, narrow in front, broadest across middle of abdomen, with the outer margins lobed. Pygidium broad with large median lobes, the second and third pair of lobes small, pointed. No circumgenital glands.

Mytilaspis indentata, Green.

Annal. and Mag. Nat. History (7), vol. vi, p. 448, pl. xi, fig. 1. 1900.

These scales were found upon the foliage of an unknown shrub at Bacchus Marsh, Victoria.

Green says: "A very distinct species easily recognised by the minute median lobes, followed by the large simple lateral lobes and by the absence of circumgenital glands. The only two other Australian species with these characters are *Mytilaspis convexa* and *M. drymidus*."

Female puparium brownish straw colour, darkest on sides and hind margin, with a very narrow white margin. First pellicle pale yellow, second almost colourless, strongly convex above; elongate narrow; usually much curved and contracted. Length, 2 mm.

1400. *Lepidosaphes indentata.* Cat. Coccidæ, p. 310.

Mytilaspis intermedia, Maskell.

Trans. New Zealand Institute, vol. xxiii, p. 7, pl. 11, figs. 5–9. 1890.

Mytilaspis intermedia, var. Victoriæ, Green, *Victorian Naturalist*, vol. xxii, p. 5, 1905.

Maskell described the type from New Zealand upon the terminal buds of *Leptospermum scoparium*. Green described the variety from specimens found upon the bark of a Wattle (*Acacia montana*) at Myrniong, Victoria. The female puparium is yellowish brown with a white line along the hind margin, very convex, with the two ends meeting on small twigs; pellicles small, dark yellow; length variable, about $\frac{1}{16}$ inch in length Male puparium not carinated. Adult female usual typical form, greyish, with tip of abdomen yellow. Abdomen with four lobes, central pair large, second pair very small. Five groups of spinnerets. Spiny hairs round the tip of abdomen. Length, $\frac{1}{20}$ inch.

M. victoriæ differs from the type, in the lateral margins of the abdominal segments not markedly produced; median lobes narrow, other lobes not noticeable. Circumgenital glands few, spiniform squames small.

1401. *Lepidosaphes intermedia.* Cat. Coccidæ, p. 310.

Mytilaspis lidgetti, Cockerell.

Victorian Naturalist, vol. xvi, p. 14. 1899.

The type specimens come from Myrniong, Victoria, upon the foliage of two different species of gum trees (*Eucalyptus rostrata* and *E. goniocalyx*).

Female puparium rather narrow, slightly curved, snow white. Pellicles deep orange, the second almost hidden by whitish secretion. Length of scale,

3 mm. Adult female with four pairs of abdominal lobes, median pair large, but short and truncate; between all the lobes a long spine and a pointed squame; the lateral lobes divided in the centre. Five groups of circumgenital glands.

"The female puparia," Cockerell says, "are very like those of *Mytilaspis casuarinæ*, but easily separated in the insect by the female by the depression between the median lobes, which are broad, little produced, and crenulate."

1406. *Lepidosaphes lidgetti.* Cat. Coccidæ, page 311.

Mytilaspis lobulatus, n.sp. (Pl. V, fig. 2.)

Type specimens taken at Gunnedah, New South Wales, upon the branchlets of a sheoak (*Casuarina sp.*).

Female puparium white, very convex, short, distinctly transversely ribbed, sloping from the middle towards both extremities. The first pellicle long, narrow, ridged down centre, forming a regular stalk, pale yellow on margins, green in the centre. Second pellicle very large, merged into and apparently occupying nearly half the basal portion of the true puparium. Reddish brown. Length, about $\frac{1}{20}$ inch.

Female coccid chocolate brown, with the pygidium very distinctly defined, the outer margin deeply serrate, showing about nine short serrate lobes divided in the centre, but somewhat irregular in form and not projecting far beyond the margin, the sides of the abdomen unbroken, with distinct transverse lines forming distinct segmental divisions. Circumgenital lobes not in groups, but running in lines to the anal aperture

Mytilaspis maideni, Maskell (Pl V, fig. 3.)

Trans. New Zealand Institute, vol. xxix, pl xix, figs 1-3. 1897.

The type specimens of this beautiful little scale were noticed upon a leaf of a herbarium specimen of *Litsea dealbata* from the Richmond River, New South Wales, sent to the Botanic Gardens, Sydney. The leaf was thickly covered with male and female scales. The female puparium light, reddish brown, broadly convex, widest in the centre, flattened towards the apex; the dorsal surface forming a regular row of rings, or ridges, from nine to eleven in number. First pellicle reddish brown, second hidden. Length of puparium, $\frac{1}{20}$ inch. Male scale smaller, lighter in colour and more regular and cylindrical in form, with six regular rings (though Maskell says eight or nine, I have examined many, but cannot find more than six).

Adult female dark brown, elongated; abdomen nearly truncate, with six very small lobes, sub-triangular, semi-transparent, and placed wide apart. Two broad conical spines between the lobes. No spinnerets, but many single orifices.

1408. *Lepidosaphes maideni.* Cat. Coccidæ, p. 311.

Mytilaspis melaleucæ, Maskell.

Trans. New Zealand Institute, vol. xxviii, p. 389, pl. xix, fig. 6. 1896.

This species was collected near Ballina, New South Wales, on a Ti-tree (*Melaleuca sp.*). Female puparium elongated, broad at the apex, greyish

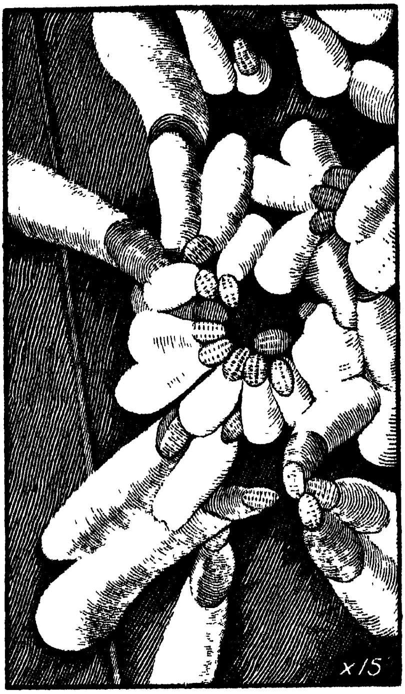


Fig. 1. *Mytilaspis formosa.*

Fig. 3.—*Mytilaspis maideni*

Fig. 4.—*Mytilaspis recurvata.*

Fig. 2.—*Mytilaspis lobulatus*, n.sp.

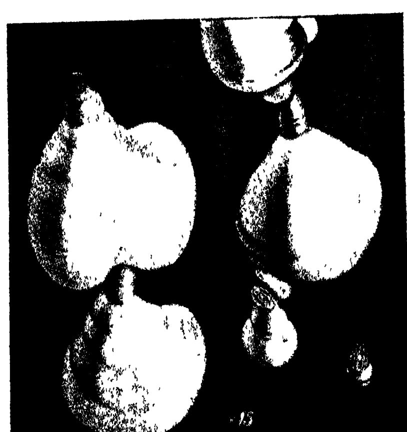


Fig. 5.—*Mytilaspis spinifera*

white. Pellicles dark orange. Length, $\frac{1}{20}$ inch. Male puparium white, convex, elongated, not carinated, smaller pellicles orange.

Adult female yellow, abdomen with four very small lobes, central ones largest; margin of abdomen with fine serrations, with two hairs between the lobes. Five groups of spinnerets. Maskell says: "Puparia of this species approach *M. casuarinæ*, *M. spinifera*, &c., and also to *Poliaspis exocarpi*; but the abdominal characters differ from any hitherto described."

1409. *Lepidosaphes melaleuca*. Cat. Coccidæ, p. 311.

Mytilaspis mulgæ, n.sp.

This scale was found covering the leaves of the Mulga (*Acacia cambagei*) at Pera Bore, Darling River, New South Wales.

Female puparium very short, and broadest in front behind the first reddish-yellow pellicle, which forms a regular stalk, with the larger second pellicle sloping upward into the pale white secretionary matter of the true puparium; the latter very convex and transversely ribbed, but not so distinctly as in *M. lobulatus*, narrowing slightly toward the hind margin. Length, $\frac{1}{25}$ inch.

Female coccid dark brown, short cephalic portion rounded, narrowed to base of rostrum, swelling out, broadly rounded to the tip of abdomen. The last two segments above the pygidium deeply corrugated and rounded on the margins. Pygidium broadly rounded, with two short broad rounded terminal lobes with two rather angulate depressions on either side, with two corresponding angulate projections between the outer edge of the lobes and the deep junction between the pygidium and abdomen.

Mytilaspis multipora, Leonardi.

Annali di Agr., vol. v, p. 87. 1903.
Green, *Victorian Naturalist*, vol. xxii, p. 6. 1905.

The original specimens which Leonardi thought Green had previously described came from Myrmong, Victoria. Specimens have since been determined from *Acacia stricta* from Dandinong Ranges, Victoria.

The scales are thickly clustered over the bark, often overlapping each other and scaling off in a mass so that they are very irregular in form. Length, $\frac{1}{10}$ inch. Light chocolate brown, with the extremities of a lighter tint; typical form narrow at base, then uniform . cylindrical to the slightly broadened apex, dorsal surface irregular. Pellicles, first light yellow, second much darker, often partially hidden with secretionary matter.

Adult female dark blackish brown, elongate, rounded in well defined segmental divisions. Pygidium with two large median lobes, serrate on sides, with two pairs on either side.

Mytilaspis nivea, Maskell.

Trans. New Zealand Institute, vol. xxvii, p. 46, pl. 1, fig. 10. 1894.

This species was collected at Bankstown, New South Wales, upon the foliage of a Ti-tree (*Melaleuca linifolia*), not on *M. nodosa*, as given in the original description. It has also been found at the Grampians, Victoria, on *Calycothrix tetragona* (C. French, jr.). Maskell says: "Close to my species

M. casuarinæ, but differs in having four conical lobes and stronger marginal lobes on the abdomen of the adult female coccid."

Female puparium white, massed together on the foliage and twigs. Maskell says: "They look exactly like snow on the twigs. "Elongate, smooth, narrow, and usually straight. Pellicles yellow. Length about $\frac{1}{10}$ inch. Male puparium very much smaller, about $\frac{1}{30}$ inch, similar in shape and colour, not carinated.

Adult female brown, pygidium with depression on the centre, with two pointed angular lobes on either side, abdominal margin deeply serrated with three or four strong spines. Five groups of spinnerets.

1417. *Lepidosaphes nivea.* Cat. Coccidæ, p. 312.

Mytilaspis pallens, Maskell.

Trans. New Zealand Institute, vol. xxii, p. 134, pl. iv, figs. 2, 4. 1889.

This species was found upon the foliage of a Fan Palm growing in a greenhouse; sent to Maskell from Sydney, New South Wales, but when later on describing the variet *alba*, said that the type was found upon Grass-tree (*Xanthorrhœa*).

Female puparium light greyish green, variable in form, elongated, sometimes broadened towards the apex, flat and thin. Pellicles small. Length, $\frac{1}{8}$ inch. Male puparium not carinated.

Adult female dark brown to purple, anterior or cephalic portion broader than usual. Abdomen with two large median lobes, a median depression, and six smaller ones on either side, the margins of abdomen with strong spines. Spinnerets, five, forming an arch.

Allied to the fern scale in New Zealand, *Mytilaspis phymatodius*. Maskell described a variety under the name of *alba* in the same Journal (vol. xxviii, 1896), on the same plant, from Sydney. The only differences are whiter and larger puparia.

1418. *Lepidosaphes pallens.* Cat. Coccidæ, p. 312.

Mytilaspis pomorum, Bouché.

Ent. Zeitung. Stett. 1851, vol. xii, No. 1.
Signoret, *Ann. Soc. Ent. France*, p. 98. 1879.
Comstock, *U.S. Report Dep. Agr.*, 1880, p. 323.

This scale has been known under the name of the Mussel Scale of the Apple in Australia, and as the Oyster-shell Bark Louse in America. Unless there was a very valid reason for altering its scientific name, it seems a very great mistake to do so. During the researches made by Mrs. Fernald when compiling her catalogue, evidence was brought forward to show that this species (*Mytilaspis pomorum*) was the coccid that Reaumer and Degeor had described and figured as the Elm Scale, and Linnæus defined as *Coccus ulmi*. His scientific description is as follows: "On the *Ulmus campestris*, Degeor Insects 5, Tab. 28, fig. 7. Shield reddish, the margin villous reddish." This description would certainly fit any species, and there is no type in existence, so it is surely very far-fetched to alter an old well-known name on such slight grounds.

This is the common Mussel Scale of the Apple tree all over the orchards of Australia, found usually upon the bark or trunk of the tree or the young branches, and from there often spreading on to the fruit, covering them with its dark brown scales, and though (except when very abundant), not spoiling the quality, yet damaging its sale for export.

Adult female puparium of the typical elongate form, narrow at the base; the pellicles dull orange to brownish, rest of puparium chestnut to reddish brown with a greyish tint. Convex tapering to a rounded apex, but often curved and even bow-shaped where the scales are massed together. From $\frac{1}{8}$ to $\frac{1}{10}$ of an inch in length.

Adult female white, sometimes with yellowish tint, pygidium yellow, elongate, cephalic portion showing three divisions, segments well defined on abdomen. Pygidium with five groups of circumgenital glands, with three pairs of terminal lobes, the median pair almost as broad again as long; second and third pair small, almost touching. Male puparium much smaller than that of female, almost straight, with only one pellicle.

Besides the apple, this scale is common on the Hawthorn when growing around the orchards.

1431. *Lepidosaphes ulmi.* Cat. Coccidæ, p. 314.

Mytilaspis pinnæformis, Bouché.

Aspidiotus, *Stett. Ent. Zeit.*, vol. xii, p. iii. 1851.
Signoret, *Ann. Soc. Ent. France* (4), vol. iv, p 97. 1870.
Douglas, *Ent Monthly Magazine*, vol. xxiv. 1887-8, 1887.

This species seems to be confounded with *Mytilaspis citricola.* I can find no authority that Maskell recorded it from either Australia or New Zealand, though both localities are given in Mrs. Fernald's catalogue. It is a species that feeds on orchids and crotons in hothouses in Europe.

1423. *Lepidosaphes pinnæformis.* Cat. Coccidæ, p. 312.

Mytilaspis recurvata, n.sp. (Pl. V, fig. 4.)

Scales thickly covering the bark of the branches and twigs of the Black Wattle (*Acacia decurrens*), Cowra, New South Wales.

Female puparium white, pellicles reddish brown, second one very large, crenulated. Scale short, very convex, rounded and depressed at the apex. Length $\frac{1}{30}$ inch. Male puparium similar, but smaller.

Adult female pale yellow, elongate, broadly rounded to the apex. Pygidium bright yellow, chitonous, finely striated, terminating in two large rounded lobes with a smaller rounded lobe on either side, and the margin finely serrate but showing no distinct lobes further round.

Mytilaspis spinifera, Maskell. (Pl. V, fig. 5.)

Trans. New Zealand Institute, vol. xxvi, p. 69, pl. iii, f. 7-9. 1893.

A large handsome scale common upon the leaves of the Weeping Myall *Acacia pendula*) in all the western scrubs of New South Wales.

Female puparium pure white, with the pellicles pale yellow, the first longitudinally ribbed, second smooth sub-circular; the whole scale looking like a little white limpet shell, nearly as broad as it is long, convex broadest at apex. Typical forms measured $\frac{1}{16}$ of an inch; but the larger form, for

which Maskell suggested the varietal name of *major*, is nearly twice the size, or $\frac{1}{8}$ of an inch in length. Male puparium smaller, flatter, with an uncarinated yellow pellicle.

Adult female orange yellow, elliptical, with thoracic and abdominal divisions distinct. Pygidium with two median lobes separated from each other, five groups of spinnerets.

1427. *Lepidosaphes spinifera.* Cat. Coccidæ, p. 314.

(To be continued.)

Black Spot of the Mandarin.

In view of the prevalence of Black Spot in certain Mandarin orchards in the Gosford District, the Department of Agriculture is arranging to carry out extensive experiments to determine the best methods for combating this disease. As a tentative recommendation, pending the results of these experiments, the Department advises orchardists having infected trees to severely prune and remove every visible appearance of diseased limbs. As the fungal hyphæ have been traced inside the living tissues, and in this position are immune from the effects of spraying, growers are recommended to take the greatest care to ensure that all affected parts are removed, not hesitating to cut away as much as 4 inches of the live wood below the affected parts. The future shape of the tree as a result of the pruning and the length of time taken in the operation are both but secondary considerations. All prunings must be burnt. This work should begin at once, and continued during the ensuing two months, before the trees make new growth. Constant examination of the trees is necessary, so that any further development may be detected.

After pruning, the trees and the ground beneath should be sprayed with a fungicide. Bordeaux mixture is suitable, if prepared at the rate of 6 lb. lime, 4 lb. bluestone (sulphate of copper), and 50 gallons of water. Lime-sulphur spray may also be used if mixed at the rate of 53 lb. lime, 100 lb. sulphur, and 50 gallons of water, being then diluted in the proportion of 1 part of the solution to 20 parts water. Three sprayings should be given, the first immediately after pruning, the second just after the fruit has set, and the third a fortnight later. In the second and third spraying, the mixture should be diluted; in the case of the Bordeaux mixture, 100 gallons water should be used instead of 50, and in the case of the lime-sulphur 1 part of the solution should be added to 28 of water. In explanation of the short interval between the second and third spraying, it might be mentioned that infection of the fruit takes place at a very early stage, and, owing to the waxy exterior of the fruit, it is particularly difficult to get it covered with spray at this stage, hence two sprayings within a fortnight are recommended. Later sprayings, depending on weather conditions, should take place at intervals until the fruit is half grown. After reaching this stage it appears to be little affected by the fungus.

"Thrips" in Orchards.

A Warning to Fruitgrowers.

W. B. GURNEY, F.E.S., Assistant Entomologist.

It is advisable at this time to recall to the minds of fruitgrowers that last year "thrips" were present in vast numbers, appearing first in considerable quantities during late September and in October. They destroyed a great percentage of the apple crop and also attacked pear and other blossoms, causing very heavy loss to many growers. It was probably the most severe visitation of this minute little insect pest for the past twenty years or more. This pest has several times been similarly very destructive in certain Victorian orchard districts. With us in New South Wales this species is probably identical with *Thrips tabaci*, which is present more or less numerously every summer in roses and garden flowers of most kinds, but is not usually destructive to fruit blossoms, though Mr. Froggatt noted a rather severe local infestation of pear blossoms in the Ryde district some years ago. During last season (1913-1914) this thrips, however, was present in hordes, not only in garden flowers of all descriptions, but in the blooms of deciduous fruit trees, the flowers of weeds and the grasses of paddocks and roadsides, and I found them even in the wild flowers of the bush, including the wattle and eucalyptus flowers.

It will be recalled that they chiefly damaged the later blossoming apples, early flowering forms escaping with much less damage.

The infestation at Bathurst seems to have been at its maximum about the 7th to the 10th of October, 1913. Full blooming occurred in the apples from about the 4th to the 18th, and all the facts considered the earlier blooming varieties escaped best, as also the pears. The later apples received the brunt of the infestation just as their buds commenced to open. Some variation occurred in the setting of the different varieties in the various orchards visited.

Thus Five Crowns—very bad to poor setting.
Rome Beauty—poor to light setting.
Jonathan—bad to good setting.
Cleopatra—bad to good setting, and so on.

It seems likely, as I shall show, that the winter ploughing and cultivating, and perhaps a late lime-sulphur spraying may have somewhat reduced the pest in the Bathurst Experiment Orchard, which suffered less than some other orchards of the district.

Plums, apricots, and peaches escaped, but some cherry trees suffered: the first three classes are early in blooming, while the cherries were late in blooming. Amongst those who suffered were growers in widely separated districts throughout the State, including Bathurst and other fruit areas along the

western line, orchards on the south coast line from Sydney to Goulburn and to the south-west, and in the north and north-west from Gosford away to Glen Innes. The thrips were therefore very widespread, and the losses varied from just a light thinning out to upwards of 75 per cent of the crop.

In view of this loss, the thrips have been kept under observation during the past summer and also this winter, and the following notes and suggestions are given as a reminder and warning of the possible recurrence of this pest during this coming September and October.

Weather Conditions as a Controlling Factor.

It will be remembered that the winter of 1913 was comparatively mild, and this favoured the survival of the thrips. The mortality due to cold and wet was reduced, and this left an unusual number of female thrips alive after winter to commence egg-laying in the early spring, so that by the time the late fruit trees were blooming the thrips were present in sufficient numbers to be seriously destructive. Certain warm days in early October doubtless further favoured the spread of the insects. Then followed a warm dry summer, which aided their further increase and spread, until flowers, weeds, and vegetables were freely infested.

This winter the weather has been colder and wetter, which is fortunately against the thrips; but this cannot be wholly relied upon, as the pest was so numerous and widespread last summer that there is a good chance of a number surviving in sheltered spots. I have observed the thrips present in tomatoes and most vegetables and garden flowers, not only throughout the past summer, but in small numbers through the present winter. Again, visiting Bathurst on 15th July I discovered, in certain odd tufts of oats and barley growing between the trees in an orchard, about a dozen thrips active and healthy, hidden away under the leaf sheaths of the stalks; and again odd thrips are to be found in the roses. This indicates that they can shelter and withstand even the cold weeks just past, and that green succulent growth can harbour the thrips during the winter.

Preventive Measures and Control.

Orchardists are therefore urged to take the following preventive measures. All green manure, weeds, and even dead matted grass or refuse in the orchard under or between the trees should be thoroughly turned under. This should be done as thoroughly as possible before the end of August, and the earlier the better. The soil should be ploughed as close to the trees as possible to expose and destroy the thrips sheltering in the soil. The cleaner the ground and the more cultivation around and between the trees the better, as in the early spring the thrips travel to the nearest blooms, and with the destruction of those thrips immediately about the trees there is a better chance of the fruit setting before many thrips have reached the trees. It will be remembered that the early blossoming apples often escaped altogether, though probably a few thrips had found these trees.

The thrips will probably be moving in September, and the next step is to spray the trees as late as possible before the buds open. The thrips appear to penetrate the blooms as soon as they begin to open ever so slightly. The spray to use at this time is the lime-sulphur wash recommended in the July *Gazette* (53 lb. lime, 100 lb. sulphur and 50 gallons of water). One gallon of this concentrated spray should then be diluted with seven gallons of water. This adheres well, and destroys all the thrips it touches. It probably has a deterrent effect in protecting the buds. As the buds are opening, tobacco wash (1 lb. to 2 gallons water) is advised. This tobacco-wash may need to be repeated if thrips are found to be still numerous. If this seems to be a lot of spraying, the difficulty of reaching the pest when in the flowers and the reinfestation from adjacent flowers which is continually occurring must be remembered. In America, four sprayings are considered necessary and are used to control orange-tree thrips (*Euthrips citri*), and similarly three sprayings to control *Euthrips pyri* (the thrips of the pear), which is closely related to our thrips in appearance and habits. It is advisable to have a strong pressure to drive the spray into the blossoms, and to give a generous drenching. It has been demonstrated that these sprays are effective in destroying where they reach and wet the thrips.

Life-history and Habits of the Thrips.

The development from egg to adult occupies from about sixteen to twenty-one days under warm conditions, though the growth is slower in cool weather. The clear whitish eggs are extremely minute and are deposited in the twigs and flowers. The egg hatches in about four to seven days into a tiny pale yellowish thrip much resembling the adult, but without any wings. After feeding and growing for about two weeks, during which it moults its skin three times, it becomes adult, that is, full-grown, with two pairs of minute wings fringed with hairs and folded over the back and out of sight when crawling in the flowers. However, it can open out these wings and fly readily. It is in this stage, minute even then as the adult is, that we can see it It is only about $\frac{1}{25}$ inch (1 mm.) long. The body is pale yellowish-brown in colour. The female bears a tiny saw-like ovipositor near the tip of its abdomen, with which she slits the tissue of the plant when egg-laying. The males are a shade smaller, and I find not so numerous as the females, and of course have no ovipositor. Feeding is accomplished by the small pointed mouth-parts, which are used both to tear the surface tissues and to suck up the juice thus set free. There are many generations possible during the long summer, and their quick development allows of many broods and rapid increase; and all stages of development are to be found within the same flower at the same time, the broods being irregular.

WOODINESS (OR "BULLET") OF THE PASSION VINE.

IN view of the occurrence of this disease in some districts, pending the completion of investigations now being carried out by the Department, it is recommended that orchardists in the districts where it occurs should adopt measures which will enable the plants to withstand the effects of the disease.

In nearly all instances where it is doing considerable damage to the fruit it will be found that the vines are not vigorous or even healthy, and that the flow of sap is irregular. The main causes of this are often insufficient manure and cultivation, and the too frequent use of the plough among the vines. Manuring at the wrong period also conduces to the trouble.

As a preventive the passion fruit vines should be pruned and manured during the spring, and again manured during the autumn, and after the first six months the plough should not be used again. The vines should preferably be kept cultivated with implements such as the spring-tooth harrow.

At least once a year the whole bed should be dug over with a pronged hoe. The object of this is to break through the hardpan which usually forms about 5 or 6 inches below the surface, and prevents free circulation of air and moisture, especially during the summer months. During the season the rows should again be broken up with the pronged hoe. The approximate cost of breaking up an acre with the hoe is from £2 to £2 10s.

Undoubtedly the constant use of the plough, which cuts through a number of roots, checks the regular flow of sap which the plant urgently requires especially during the summer months.

The manures found suitable for passion vines, and the times at which to apply them, are as follow:—

Blood and bone. Apply early in the autumn, at the rate of 5 cwt. per acre.

Superphosphate 1½ cwt., Sulphate of Potash ¾ cwt., and Sulphate of Ammonia 2 cwt., or a total of 4¼ cwt. Well mixed and applied in the spring.

Superphosphate 1½ cwt., Sulphate of Potash ½ cwt., and Sulphate of Ammonia 1 cwt., or a total of 3 cwt. Well mixed and applied about December.

The above dressings are for vines 18 months old and upwards. Some growers consider two dressings during the year sufficient, *i.e.*, autumn and spring after the vines have been pruned, and using about 6 cwt. of each dressing.

Growers are strongly advised to carry out this treatment on at least a portion of their holding, and the results should warrant the extension of the treatment to the whole of the area under passion vines.

Hints on Grafting Phylloxera-resistant Stocks.

DAVID JENKINS, Superintendent, Narara Viticultural Station.

THE design of these notes is to bring a knowledge of grafting phylloxera-resistant stocks and of the principles on which it is based within easy reach of vignerons. For one vigneron interested in grafting phylloxera-resistant stocks ten years ago, a hundred or more are interested in the subject to-day, and it is hoped that these will welcome an attempt to place simple but practical knowledge within their reach.

Preparation of Cuttings for Grafting.

The resistant cuttings to be used as stocks for grafting must be in excellent sappy condition at the commencement of operations, and this can be done by keeping them buried in sand until required. Cuttings should, preferably, be 9 inches long, but may be up to 12 inches, and should be not less than $\frac{1}{4}$ inch in diameter at the small end (see Fig. 1). The lower cut should be just below a node or joint, for we know that the roots grow stronger and more abundantly on a node than an internode. This is absolutely necessary for all cuttings which root with difficulty. The upper cut is made from 1 inch to $1\frac{1}{2}$ inches above a node, which gives sufficient length for the grafting cut. Special care must be given to the removal of all buds on the stock; a large clean cut of at least $\frac{1}{4}$ inch diameter must be made, as shown in the illustration, in order to remove not only the main bud, but also the small adventitious or dormant buds which lie around its base, and which, when not carefully cut out, often grow, forming suckers which flourish at the expense of the graft. The cuttings for use as stocks are taken out of their burial-place as required and thoroughly washed, and may even be submerged in water for an hour; it should not exceed this time, as excess of water prevents the formation of knitting tisues. The washing and placing in water has also the object of cleaning the cuttings from all adhering dirt and sand, which would blunt the edge of the sharpest grafting-knife in a very short time; it also makes the stock easier to cut.

Scions.

The scions are prepared in a similar way to the stocks, with the exception that the eyes are left (see Fig. 2). The best kinds of scion are those from well ripened and fruitful canes, with but one good plump eye or bud. The scion when cut should be of a bright green colour; if whitish it indicates that it has become too dry, and therefore it is advisable not to use it. The

scions are then put into a bucket of water for a short while to wash them. In this way they remain fresh and sappy, which also greatly facilitates the making of cuts.

Method of Grafting.

Grafting operations are somewhat tedious in description, but the work is quickly done when learned. Expertness is the result of intelligent practice; the chief thing is to work systematically, making the cuts at one stroke with the knife. Taking off shavings whittles time away, but first attempts are necessary, and these should be made experimentally. A few cuttings and scions, a sharp knife, and a little tying material will enable anyone of ordinary intelligence to learn the art of grafting by the fire-side, and it certainly ought to be learned by every vigneron who intends to reconstitute his vineyard. There are many different systems of grafting. Some of these are very ingenious indeed, but the most popular method for bench grafting is the whip-tongue graft, usually made by hand with a grafting knife. Both stock and scion should fit exactly (as illustrated in Figs. 6 and 7) when made with the knife. The sections must be cut with one sweep, the blade of the knife should be left in the scion (as illustrated in Fig. 6). On no consideration should the stock or scion, when once cut, come in contact with anything before being joined together. The grafts are then tied with raffia slightly moistened, which will decompose quickly and allow of the expansion of the grafts. The free ends of both stock and scion should be made firm with a few turns of raffia (see Fig. 8), and the rest with spiral turns, which leaves as much of the union in direct contact with the sand as possible. The sand, while keeping the union sufficiently moist, does not completely exclude the air which is necessary to the formation of healing tissue. The grafts are then tied in bundles of, preferably, 25, to facilitate counting, and put away to callus, or they may be planted straight out in the nursery, provided the weather conditions are favourable.

Method of Callusing in Sand.

If it is convenient to graft in July or August, it is not advisable to plant straight out in the nursery; it will therefore be necessary to callus the grafts. A method adopted by me is to select a warm, sheltered position near the grafting shed. When the grafts are completed, these are tied in bundles and placed in a sunken bed dug about 12 inches deep. Here they are set upright, covered with about 18 inches of sand or light sandy soil, and left to callus. A piece of corrugated iron, bark, or water proof covering should always be handy during wet weather in order to protect the grafts from excessive moisture, which must as far as possible be avoided. Cold nights must also be guarded against. Always remove the covering on warm, sunny days. On the return of warmer weather, say September, after carefully preparing, manuring, and trenching the ground, the grafts are ready to plant out in the nursery.

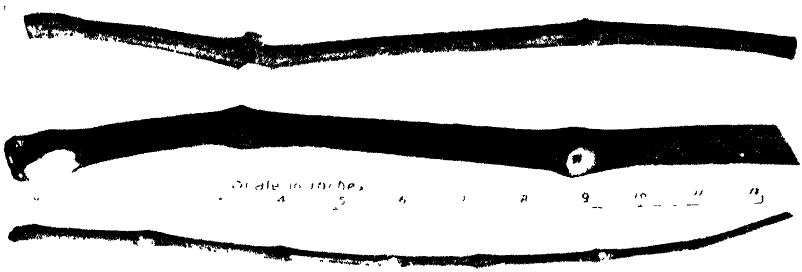


Fig. 1.

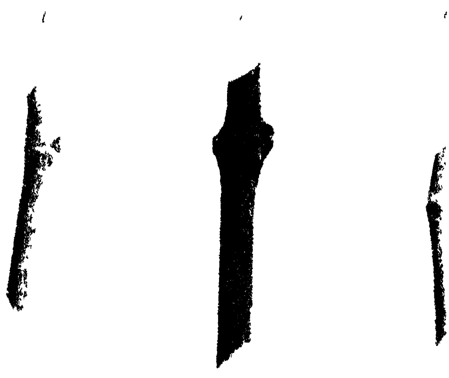


Fig. 2

Fig. 3.

Fig. 1.—The size of the stock; [illegible] the most suitable; [illegible] too thick; [illegible] too thin.

Fig. 2.—The size of the scion; [illegible] the most suitable; [illegible] too thick; [illegible] too thin.

Fig. 3.—The knife used for budding.

GRAFTING PHYLLOXERA-RESISTANT STOCKS.

Fig. 4 Making cut in stock.

Fig. 5 The cut in the scion, with knife left in to show the tongue

Fig. 6 Joining stock and scion without removing the knife from the tongue This greatly facilitates the operation by keeping the tongue open.

Fig. 7 – Removing the knife after completing the graft.

GRAFTING PHYLLOXERA-RESISTANT STOCKS.

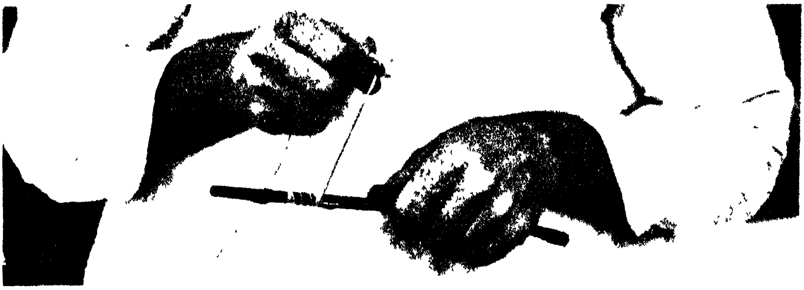


Fig. 8. Tying stock and scion

Fig. 9. Finishing the tie without knotting or waste of raffia

Fig. 10. The tie complete.

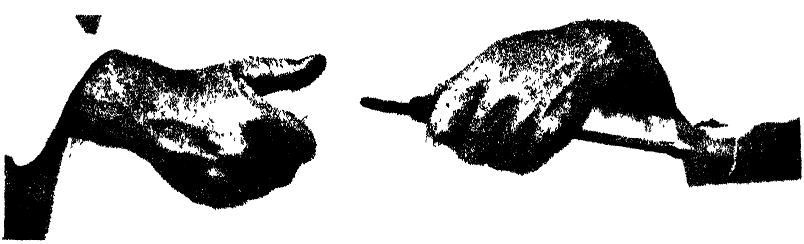


Fig. 11. Cut on stock too short for effective union

Fig. 12.—A successful union. Greenache grafted on Rupestris du Lot. Seven months from graft.

Fig. 13. Method of planting grafts without making the usual trench.

GRAFTING PHYLLOXERA-RESISTANT STOCKS.

Planting the Grafts in Nursery.

The ground intended for the nursery should previously be manured with well decomposed stable manure. As far as possible avoid establishing the nursery in soils the surface of which forms a crust after rain, as the buds remaining imprisoned cannot shoot through the hard crust, and therefore die off. A typical nursery soil is a Chinaman's garden. The planting may be done successfully with a spade (as illustrated in Fig. 13). The grafts should be placed 4 inches apart, nearly vertically, in rows $2\frac{1}{2}$ to 3 feet apart, according to the method of cultivation. What is very important is that the soil should be rammed round the butt of the stock with the spade, then pressed with the foot, as it is of very great assistance in the formation of roots. The grafts should be planted just level with the surface of the ground; then the soil is heaped (as illustrated in Fig. 14) right over the grafts to keep them moist and prevent drying out.

Removal of Roots from Scions.

During the summer months the grafts require unremitting attention, as there is a tendency to throw out roots from the scions, which I maintain should never be permitted, as it interferes with the completeness of the union. Instead of disrooting the vines by means of the knife, which is always a severe operation, the soil should be carefully removed and the white shoots of each root, picturesquely known as "snail's horns," rubbed off about two or three weeks after planting out, and periodically until January. This method checks the growth of the scion and ensures that all root activity flows from the stock from the very outset. It is important to have numerous strong roots on the stock, together with as complete a union as possible. This can be obtained by adopting the method outlined.

Cultivation.

The only cultural care required is continual hoeing and cultivating in order to prevent weed growth and evaporation. If the nursery is at all exposed to the prevailing strong winds, steps should be taken to provide wind-breaks, say every 12 rows, to protect the young grafts. I do not altogether hold with irrigating the grafts in the nursery except in extreme cases, as it is not fair to the vigneron who may have to plant out the grafts on a hillside, where they must naturally feel the absence of the tender treatment they received in the nursery.

During the month of January the soil should be removed from the grafts, and the union exposed to the air to lignify until lifting time. Special attention must be given the young vines in order to prevent Oidium and Black Spot; therefore it is necessary to commence sulphuring as soon as they are out in leaf during warm weather, and spraying with Bordeaux during dull and moist weather

Planting out Grafted Vines in the Vineyard.

When planting out the grafted vines in the vineyard, it is important that they should attain as great a development as possible during the first year.

It is essential that the ground should be trenched or subsoiled. When ready for planting, a hole is dug, and each should receive a double hand-full of well decomposed stable manure, well mixed with the soil at the bottom of the hole. The grafted vine (which has previously been boldly cut back to one or two eyes, and the roots to about an inch, in order to encourage root activity,) is now planted, the graft being about an inch above the surface of the ground. The soil should be slightly firmed with the foot about the roots; this is essential to success. The graft is then left bare, having previously been hardened off in the nursery. I have always adopted this method with great success in warm districts. During the first year in the vineyard, the grafted vines, having been previously staked, should be allowed to make as much growth as possible without pinching back or stopping, and the cultivation should be kept going. A good plan is to sow Cape barley very early in the season, say every twelve rows in the vineyard, as a break wind to protect the young vines in their early stages of growth

A Mother Plantation of Resistant Vines.

Once the method of grafting has been thoroughly mastered, there is no reason why every vigneron should not have his own mother plantation of the varieties of phylloxera resistant vines which suit his particular conditions. One hundred of these would be ample for an average-sized vineyard. By carrying out the grafting during the slack season, the reconstitution of the vineyard could be gradually completed without any considerable expenditure of either labour or money.

HIGH BUTTER FAT YIELDS.

In order to stimulate an improvement in the breeding, feeding, and testing of dairy cattle, the Minister for Agriculture (the Hon. W. G. Ashford) has decided to offer a special prize of £100 to the owner of the first pure-bred cow that produces 1,000 lb. of butter in twelve months. The conditions attaching to the payment of this prize are that the butter calculations are to be made on the chart recently issued by the Dairy Expert of the Department, which is now used for calculating the results under the United Pure Bred Cattle Breeders' Association, that the prize is not to be given to any cow which does not produce a calf within eighteen months of the date of commencement of the test, and that any cow which slips her calf is to be ineligible.

Encouragement such as this should be productive of immense benefit to the Dairying Industry. There is every reason to hope that in due course the prize will be claimed by some progressive dairy cattle owner who can furnish this practical evidence of his success both as a breeder and live stock husbandman. In America there are several cows which have exceeded the standard of 1,000 lb. of butter, and it is hoped that this State will produce animals capable of giving equally high yields.

Fig. 14. The grafts covered.

Fig. 15.—General view of grafts in the nursery, showing the natural shelter available.

Fig. 16. Graft showing imperfect union.

Fig. 17. Graft showing perfect union.

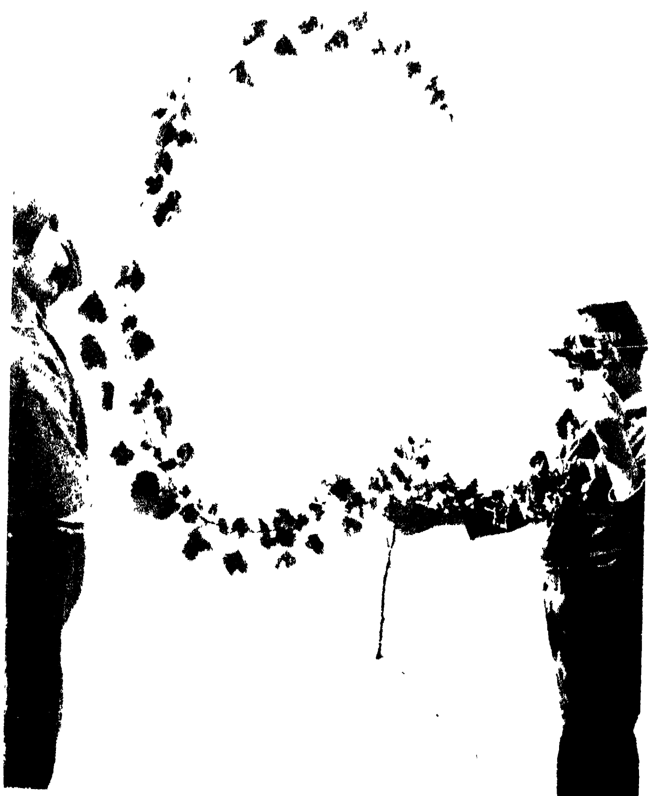


Fig. 18. Shiraz grafted on Riparia x Cordifolia-Rupestris 106[8]. Showing top growth and roots.

GRAFTING PHYLLOXERA-RESISTANT STOCKS.

Fig. 19. - Brown Muscat. Grafted on Chasselas x Berlandieri 41b. Showing top growth.

Fig. 20. Rootling of Chasselas x Berlandieri 41b. Showing the vigour of roots and scanty top growth. Compare with Fig. 19 to show vigorous growth of scion when grafted to this stock.

GRAFTING PHYLLOXERA-RESISTANT STOCKS

The Use of the Evaporator in Drying Fruit.

W. J. ALLEN.

WHILST we make as much use of the sun as possible, there are times when, with adverse weather conditions, we must of necessity resort to the curing, either wholly or in part, by artificial heat. When a large quantity of fruit is cured annually, the grower cannot have a better insurance than an evaporator included in his outfit, in order that when the weather is either too cool or wet, or both, fruit may be wholly or partly cured, and thus serious loss may be prevented.

We have in this country one or two local makes of evaporators in use. Mr. J. Sutton, of Hornsby, makes one or two small sized machines, whilst the Government have three different designs in use, situated at three different orchards, viz., Hawkesbury Agricultural College, Bathurst Experiment Farm, and Wagga Experiment Farm. Thanks to Mr. Hogg's efforts, we have machines invented by him now in use at Wagga and Bathurst orchards, both of which are working satisfactorily. They are made after the shape of a long box with a door at either end. The fresh fruit is placed in the machine at the cool end, which is situated some distance from the furnace, whilst the cured fruit is removed at the door which is directly over the furnace. By this method the cold and moist fruit enter the cooler end, when it gradually heats up, and is moved further down the box as trays of dried fruits are withdrawn. This emptying and filling process goes on continuously whilst evaporation is in progress. There is a fan which is run by a small engine, which draws the air through the hot-air flues of the furnace and over the fruit, discharging the moisture-laden atmosphere either out of the door or into the furnace again. These fans are made in different sizes, from a few inches up to several feet. At Wagga we use one 3 feet in diameter, whilst at Bathurst a smaller one is in use. These create a good current of air, which is continually passing over the fruit, removing the moisture and hastening the drying process. The machine is suitable for the curing of apples, pears, apricots, peaches, figs, prunes, &c., but is of very little value for wholly curing raisin grapes. It is, however, valuable for finishing them when they are nearly dry, particularly late in the season, when it is often found next to impossible to complete them in the sun, which at that time of the year does not always give sufficient heat to complete the work.

In America and Tasmania large kilns, different to the one described, are used for apple-drying, but whilst they are quite suitable for the curing of apples, they would not be so valuable for apricots, peaches, pears, and some other fruits as an evaporator similar to the one under review.

When apples are handled on a big scale, as is the case in many of the large apple-growing centres in Tasmania and America, the fruit is fumigated immediately after it is peeled and cored, after which it is run through a machine which slices it before it is placed in the evaporator.

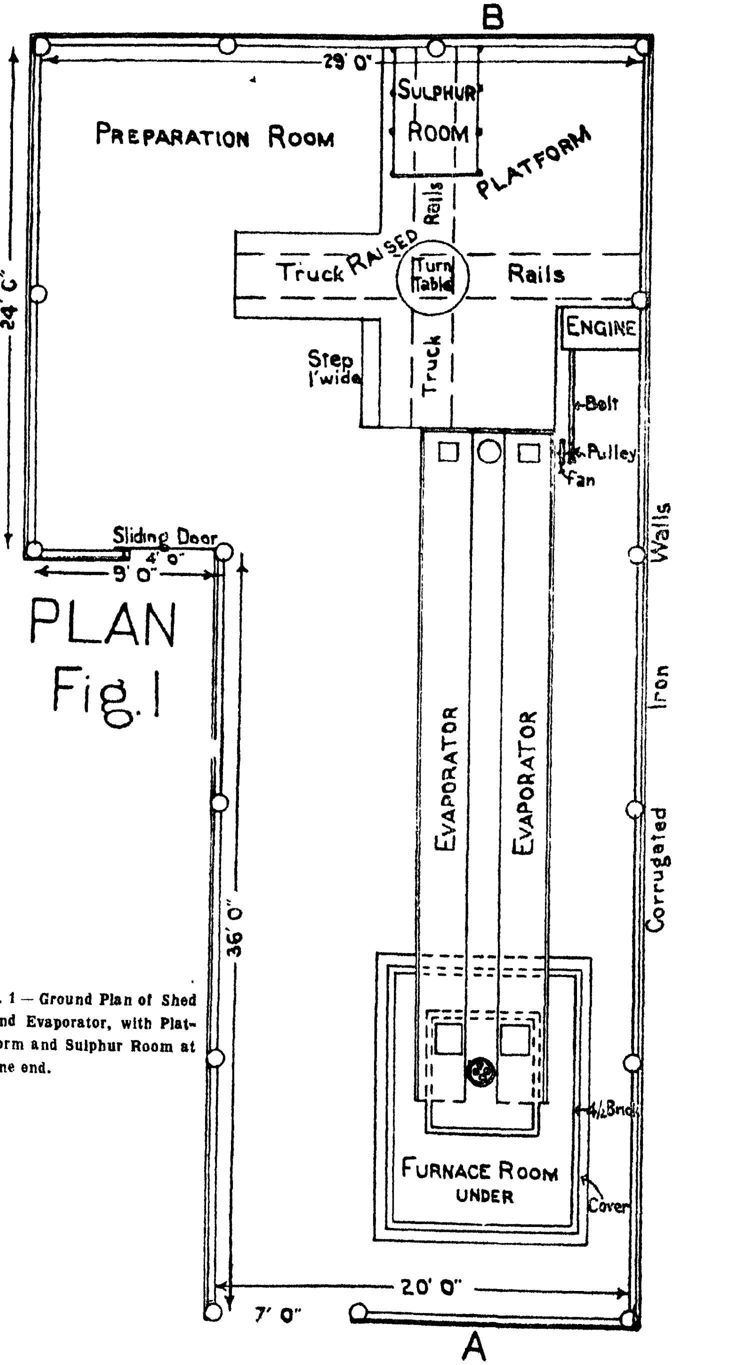


Fig. 1 — Ground Plan of Shed and Evaporator, with Platform and Sulphur Room at one end.

The State of New York prohibits the sale of adulterated evaporated apples. For the purpose of the Act, evaporated apples are considered as standard if they do not contain more than 27 per cent. of water or fluids as determined by drying for four hours at the temperature of boiling water. It will thus be seen that they are considered adulterated if they contain more than 27 per cent. of moisture.

Peaches, apples, pears, apricots should be fumigated with sulphur, with as little delay as possible after they are peeled. The evaporation may be kept at about 140 to a little higher, according to the condition of the fruit in the evaporator. The drier the fruit becomes, the higher the temperature may be kept.

In describing the procedure to follow in the curing of several kinds of fruit I have in a few instances stated the temperature at which they will cure quickly. It may in some instances be found advantageous to run the evaporator at a higher or lower temperature, which is altogether optional. A little experimenting will be necessary to find out just how to turn out the best samples in the most economical way.

Fruit Evaporator.

The accompanying plans and the following general description are supplied by Mr. A. Brooks. Works Overseer to the Department. The plans and details here given are those of the evaporator as constructed and now in use at the Bathurst orchard.

A reference to plan No. 1 will show that the building provided is 60 feet long by 20 feet wide, with a lean-to 24 feet long by 9 feet wide on one side. the construction of which is shown on section AB, No. 1.

The evaporator consists of two rows of 22-gauge galvanized-iron casing, 3 ft. 6 in. x 2 ft. 6 in. inside, made in 6-feet lengths, with angle iron frames on each end, and strengthened between the ends by bands of 1½ in. x ¼-inch iron, all bolted to the casing with ¼-inch bolts and nuts. At the furnace end of these are provided tee-piece inlets 18 in. x 1 in. to connect with top of hot-air chamber, and at the other end similar connections for the outlet of the hot air.

It will be noted that provision is made to carry off the hot air, either by means of the chimney-stack 30 feet high, or by the Sirocco fan, in which case it is returned to the furnace chamber and reheated.

Dampers are inserted in the flue pipes to regulate the escape of hot air, either way.

At the ends where the trays are withdrawn a platform is provided, and extended to provide sufficient space to accommodate the sulphur room and truck rails. The evaporators, when bolted together, are supported on wood bearers, fitted into the door frames provided at the sides, and marked A, B, and C on Plan 3, and on each end. These doors are balanced with lead weights and hung over galvanized awning pulleys and best hemp cord, and are secured to fit tightly against felt linings tacked in the rebates of the frames. Each length of evaporator is fitted with wood slides, to carry the trays, having sash rollers fitted in at distances to suit the length of tray in use. A small engine is placed where shown on plan to drive the Sirocco fan,

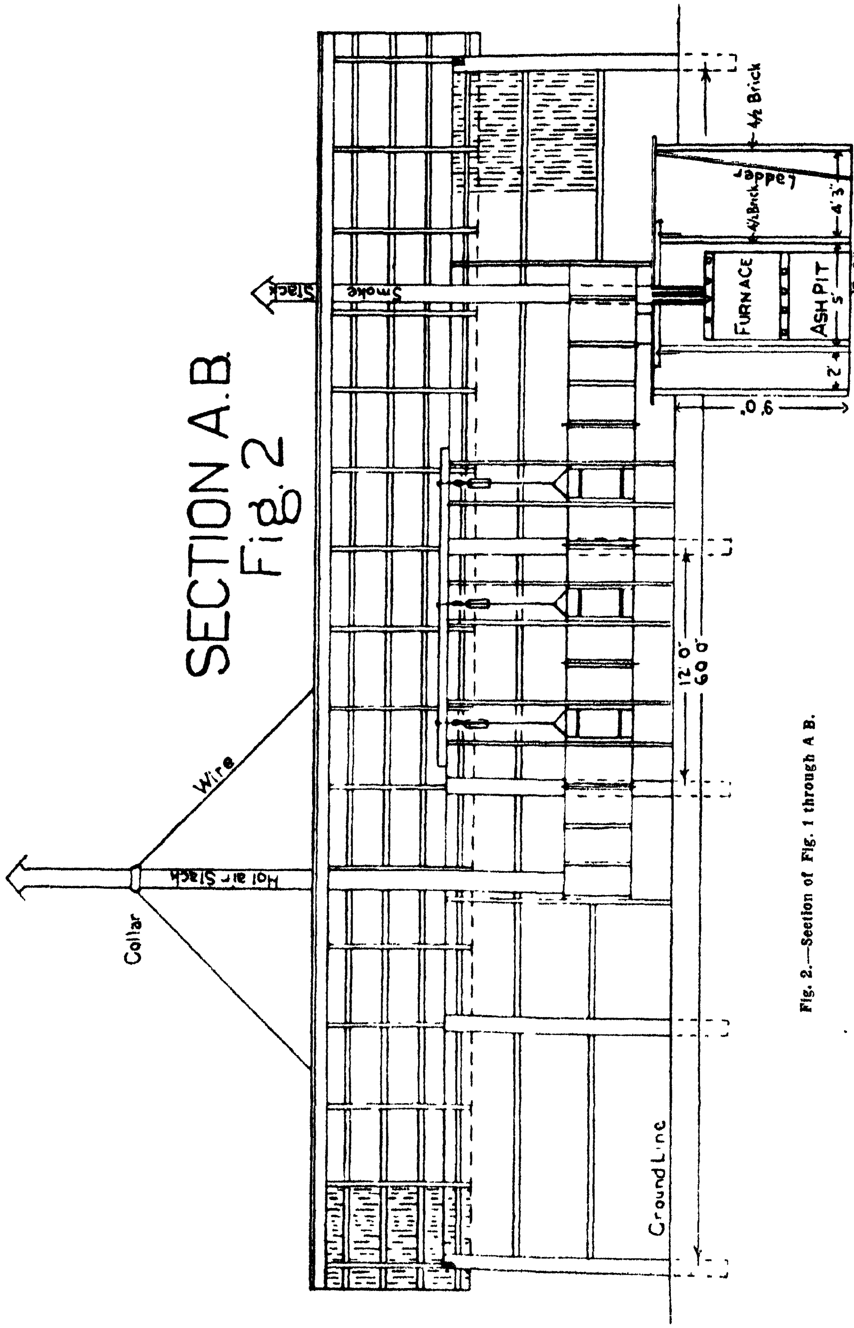


Fig. 2.—Section of Fig. 1 through A B.

from which the return air flue-pipe is taken along the floor under the evaporator to the stove.

The hot-air stove is a cast-iron chamber, about 4 ft. 6 in. long x 4 ft. 6 in. high and 3 ft. 6 in. wide, made in separate plates, bolted together, and each side plate having 2-inch wide webs at 2-inch spaces, which almost double the heating surface of the stove. A reference to the plans shows that this hot-air stove stands over the furnace frame, and internally it has diagonally placed four pairs of cold-air inlet pipes, which also act as stays to the stove. These are fitted on the lower ends with movable covers to regulate the amount of cold air to be admitted. On the top of the stove are set four separate smoke-stack pipes, all inside a circle of 11 inches, so that over the upper ends the 12-inch sheet iron smoke-stack will stand. The fire from the furnace plays about in the interior of the stove, and the whole is set in brickwork, as shown on the plans. Firebricks are used for the inside of the furnace. Additional cold-air inlets may be provided, one course of bricks above the round pipes passing through the stove, as shown on the section of furnace.

Above the crown of the furnace the walls enclosing the stove is single brick thick, 4 inches off the sides, and carried up about 2 feet 6 inches over

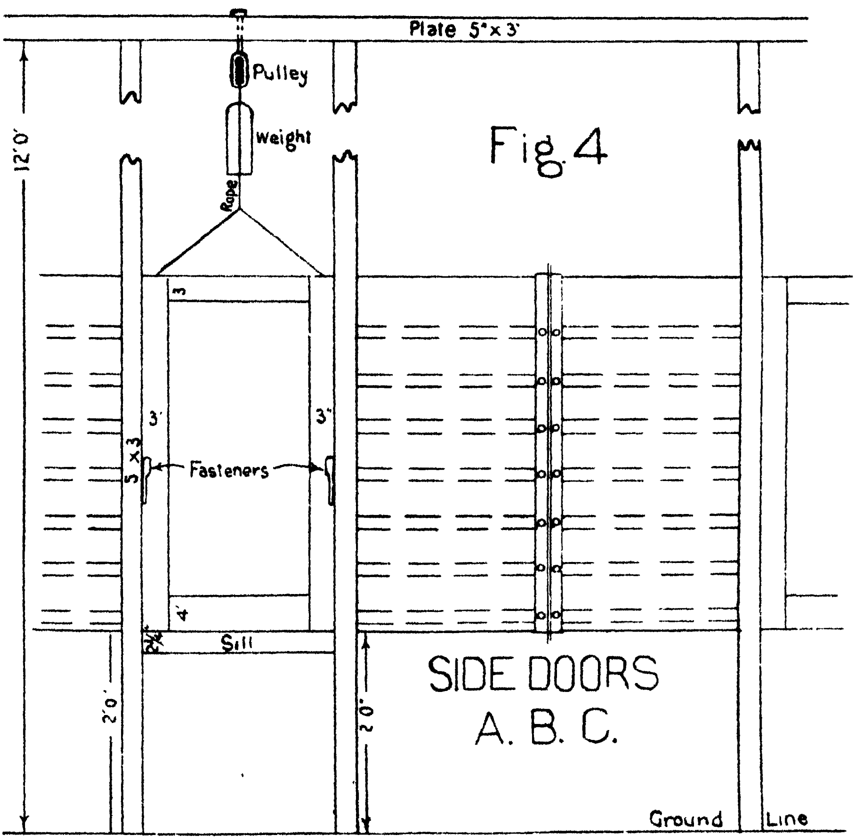


Fig. 4.—Details of Side Doors.

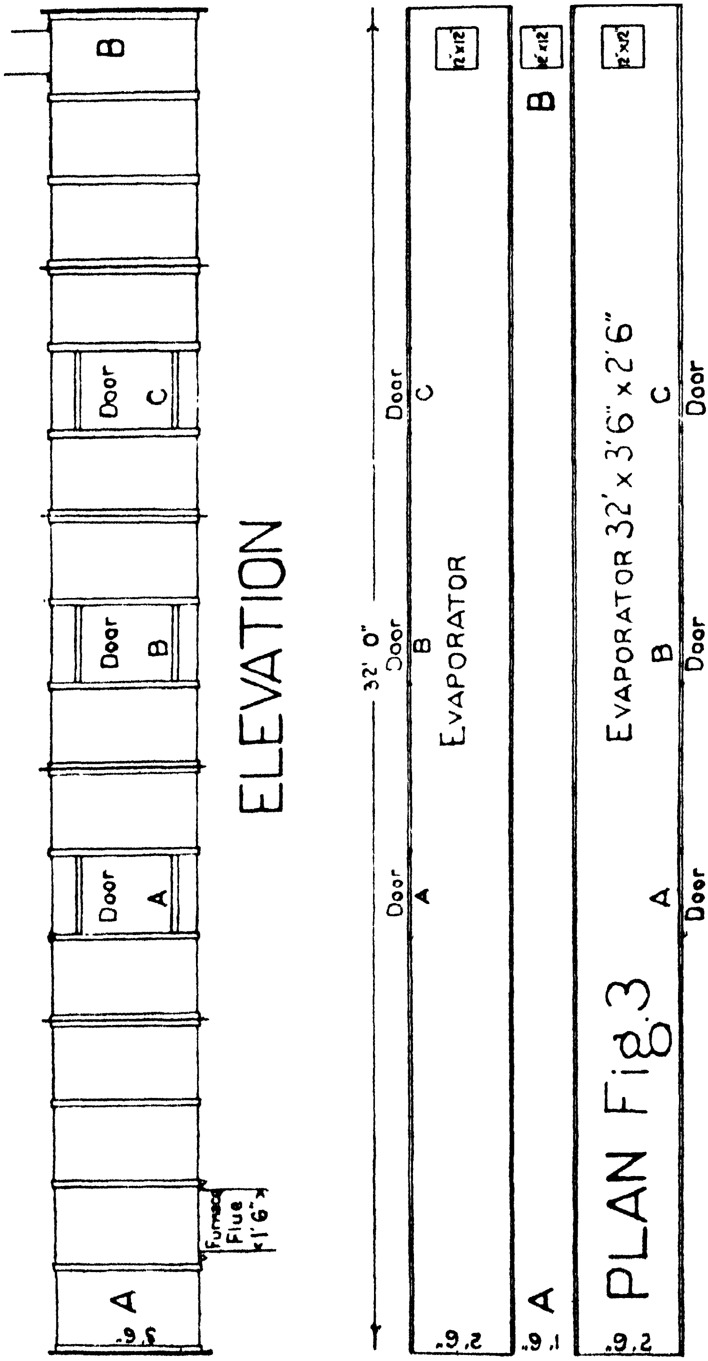


Fig. 3.—Plan and Side Elevation of Evaporator.

the crown, the whole area being covered with wrought-iron plate, the edges turned up 2 inches deep, or having a 2-inch angle rod bolted on to form a tray holding 2 inches deep of lime mortar filling or asbestos. In this space the hot air accumulates, and is admitted to the evaporators through the 18-in. x 18-in. openings shown on the "elevation and section" of the furnace room. Over this tray, and covering the greater portion of the area of the furnace room, is laid 2-inch timber decking, with hinged hatchway down to furnace. (See plan over furnace room.)

The furnace room, about 12 feet x 9 feet inside, and 10 feet deep, is lined with 4½-inch brickwork set in cement mortar, the floor paved with bricks.

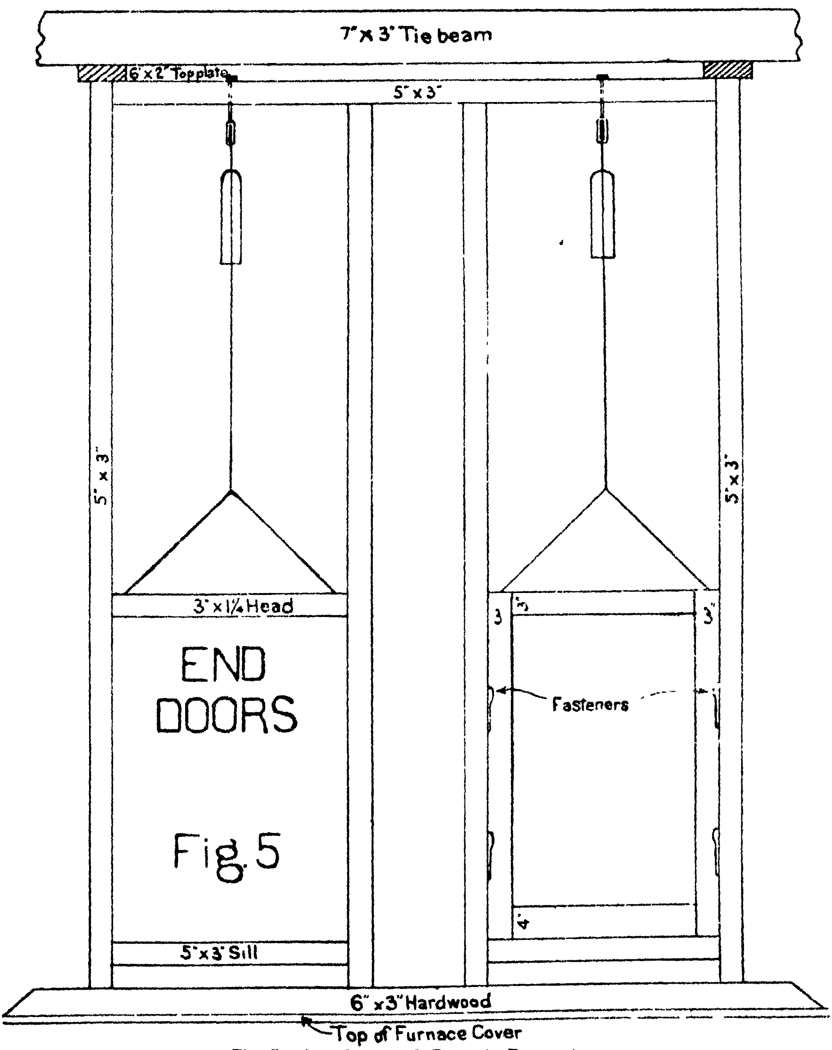
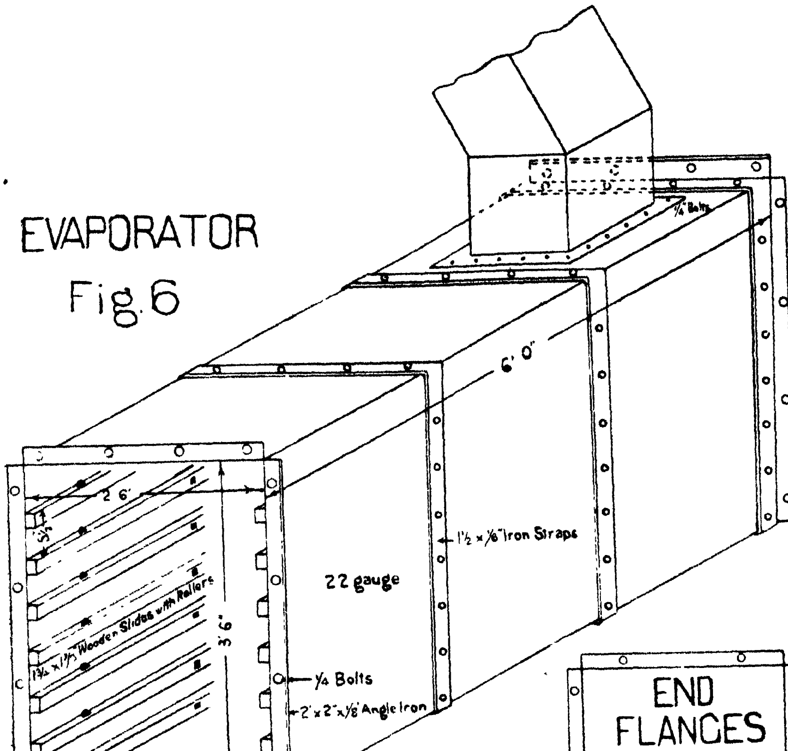


Fig. 5.—Details of End Doors to Evaporator.



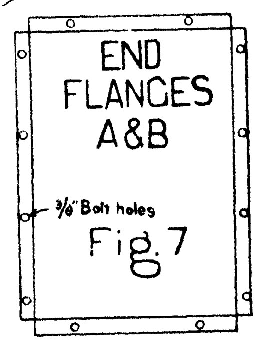
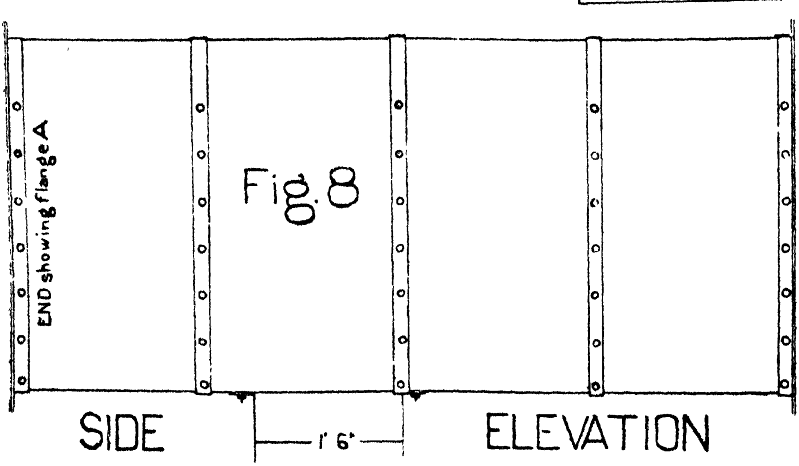


Fig. 6.—Detail showing construction of one length of evaporator fitted with tray slides inside and hot-air outlet flue connection.

Fig. 7.—Flanges used for outer ends to take door frames.

Fig. 8.—Side elevation of length over hot-air Stove.



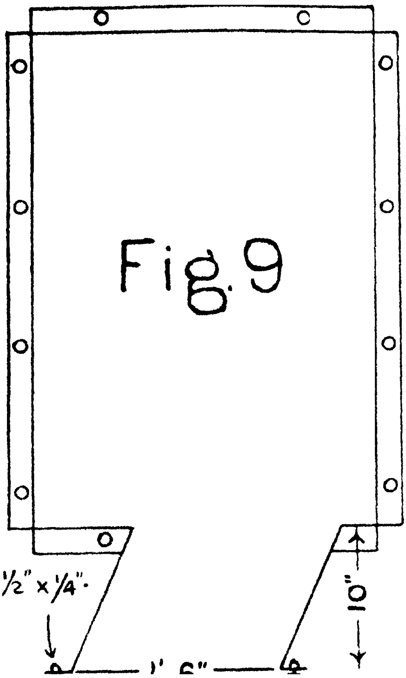


Fig. 9. Showing end view of Fig. 8.

Fig. 10.—Showing side view of length with door opening and holes in iron frames for bolting the tray slides through.

SECTION FLUE.A

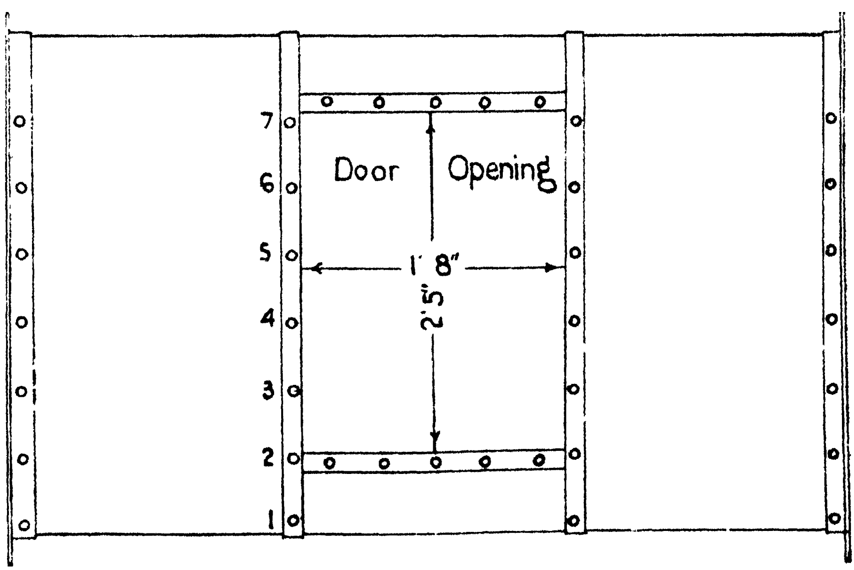
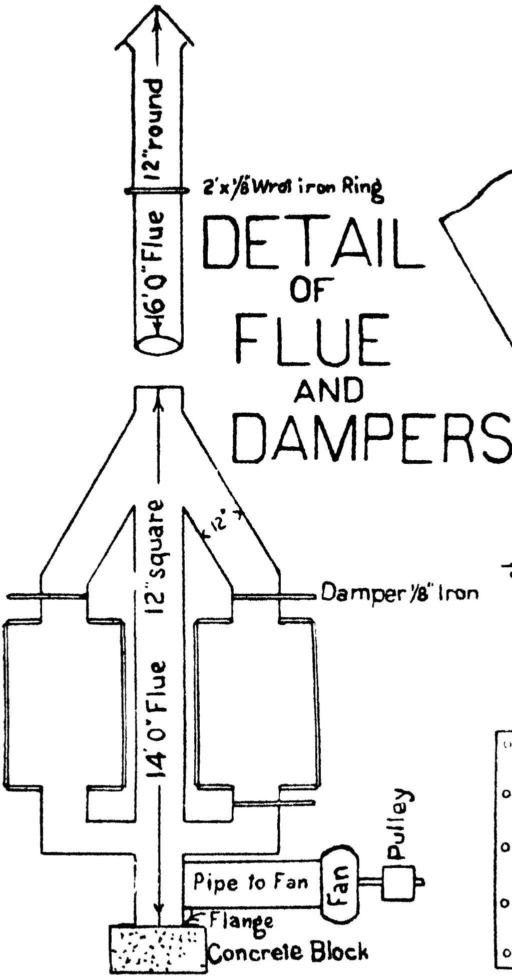


Fig.10



1/4" Scale
Fig. 11

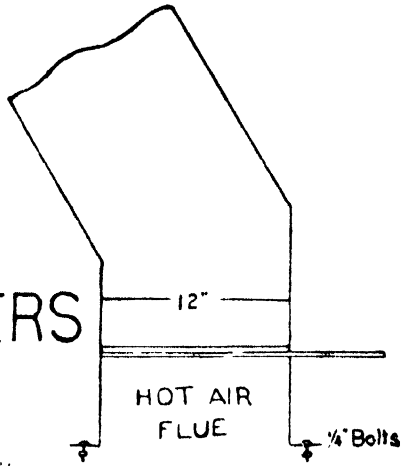
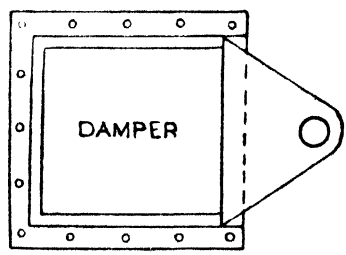
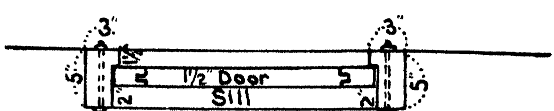


Fig. 12



1" Scale
Fig. 13



DETAIL OF SIDE DOOR

Fig. 11, 12, and 13.—Showing arrangement of hot-air flues and dampers.

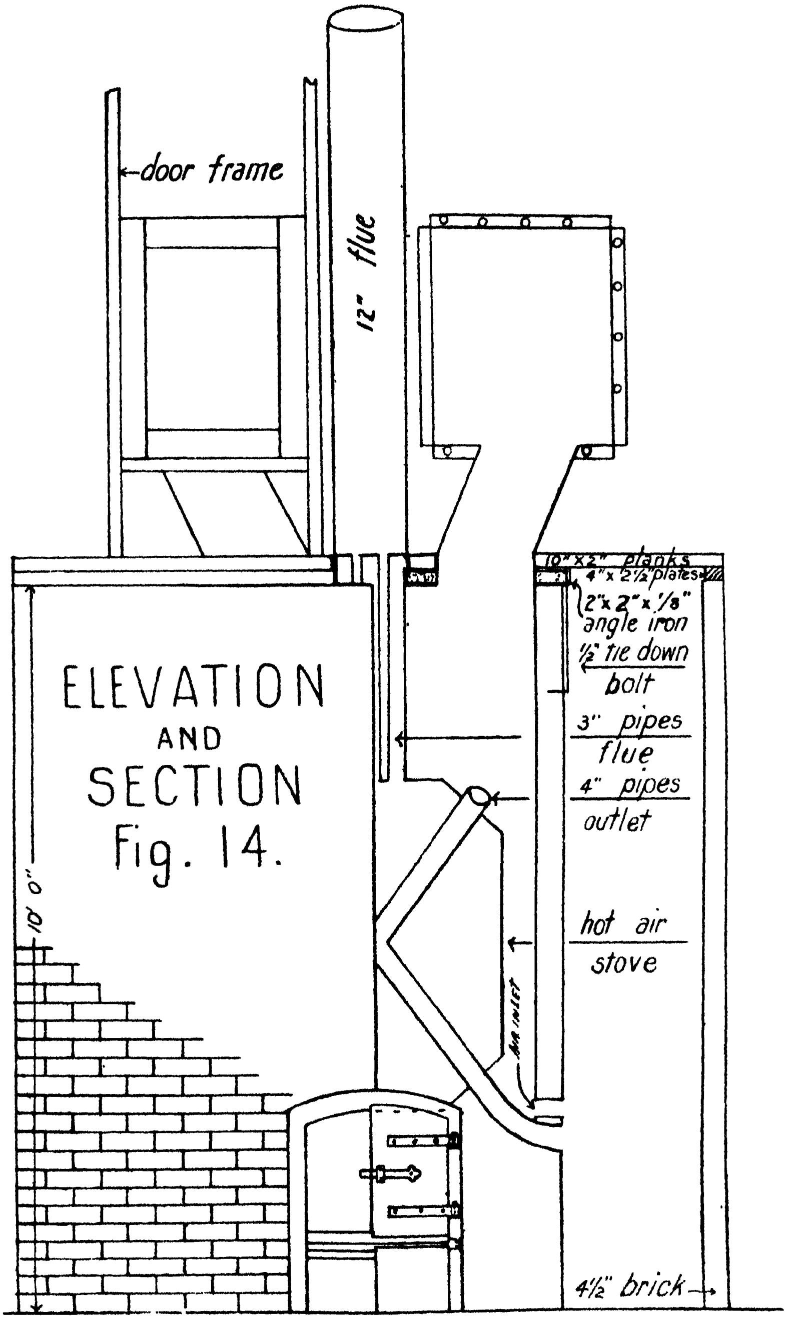
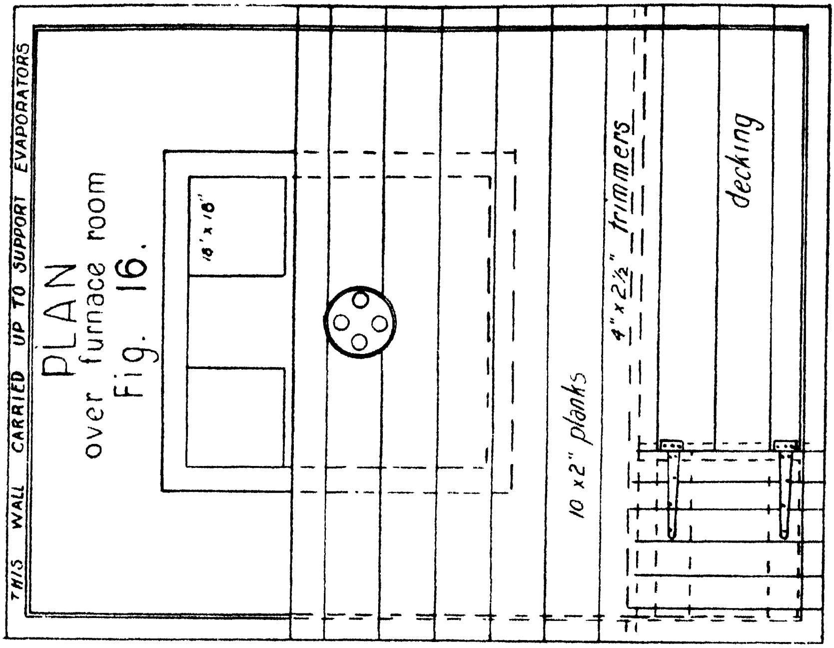
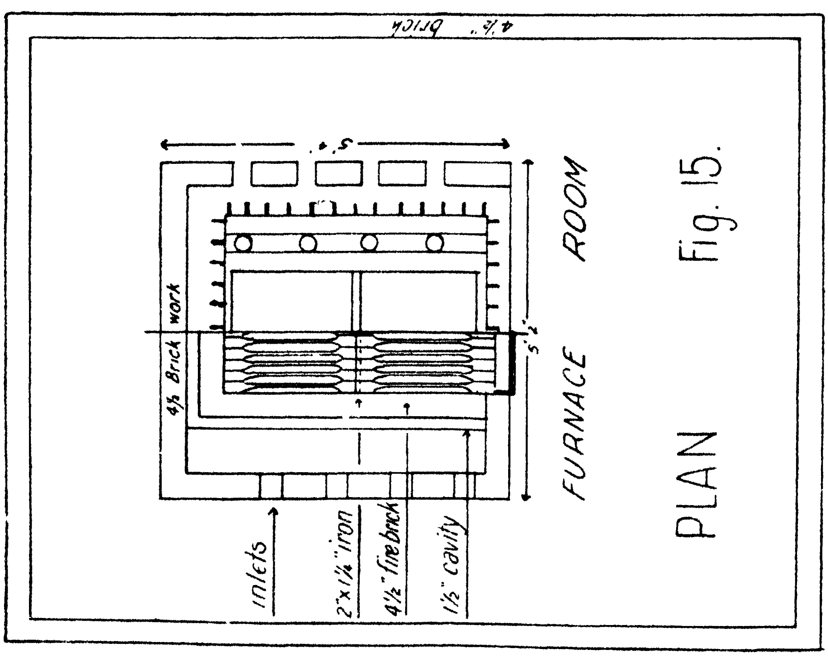


Fig. 14.—Elevation and section of hot-air Stoves and Furnace.





Figs. 15 and 16.—Plans of hot-air Stove and Furnace as arranged in room 12 ft. x 9 ft.

Poultry—The Cost of Production, and Values.*

JAMES HADLINGTON, Poultry Expert.

It will be remembered that at our last annual Conference a paper was contributed by Mr. F. J. Brierley upon the above subject, which evoked much discussion, and not a little hostile criticism, and there was a division of opinion in the Conference as to the soundness of Mr. Brierley's deductions; but statements by his critics were made very wide of the mark, and it was evident that the most vague notions were entertained as to the actual cost of production. The method by which Mr. Brierley arrived at his figures was, perhaps, not of the most convincing character, and his figures would appear to be somewhat too low Then, again, the age (three months), to which the birds were brought, was unsatisfactory for a basis of calculation, seeing that to constitute a profitable proposition, they should not be sold at that age. Therefore, three months fell short of what is actually needed by poultry-farmers as a guide to their operations. But it must be said that Mr. Brierley was very much nearer the mark than he was given credit for; and credit was due to him for his attempt to enlighten poultry-keepers upon a matter that is almost entirely evaded by writers upon poultry culture, for the simple reason that the incidence of chicken-rearing makes it extremely difficult to arrive at the cost of production. It is, however, of the most vital interest to poultry-keepers to be able to define cost of production. Fancy a manufacturer not knowing the cost of production of any article he was producing! Yet that is exactly the position in which the poultry-farmers find themselves. It is about time we undertook to place the poultry industry upon a commercial basis. Not only should we know the cost of production, but we should also know the prospective value of the product. Here, again, it is regretted that very vague notions are entertained.

Having reviewed what has been done, I propose to advance this to a stage approaching finality, by showing the actual cost of production, not to three months' old (which age, by the way, does not meet requirements), but to the age at which the cockerels should be sold, or at which the pullets commence to lay. Further, the figures I am giving you are not based upon the results obtained with thirteen chickens (as was seriously put forward by a prominent utility organisation in another country), but upon an experiment with 1,200

* Paper read at the Sixth Annual Poultry Conference, Hawkesbury Agricultural College, on 6th July, 1914. Prior to reading the paper, Mr. Hadlington explained that it was the outcome of a question raised at the Poultry Conference three years ago. The matter was followed up with a paper on "The Cost of Rearing," contributed by Mr. F. J. Brierley last year.

birds, comprising principally Leghorns, Orpingtons, and Wyandottes, of both sexes, and in about equal numbers, under identical conditions. The chickens were hatched from 1st August to 30th September, the best possible months in which to carry out a test of this kind, because, as is well known to poultrymen, a more uniform and better development is secured during the spring than during any other period of the year, seeing that two-thirds of the poultry output is secured during that season.

Method of securing the Data.

The method by which the figures were secured was that the total value of the feed, grit, &c., was booked up, as brought into the experiment, at invoice rates. The feeds used were :—Rolled oats (for baby chickens to two or three days old), bran, pollard, wheat, maize, and kibbled oats. The prices of foodstuffs during the experiment were as follow :—

	s.	d.	
Rolled oats	0	2	per lb.
Kibbled oats	1	6	per bushel.
Bran...	0	10½	„
Pollard	0	10½	„
Wheat	3	6	„
Maize	3	0	„

Little maize was used. On these rates 1,200 chickens were brought to 5½ months old for £70 17s., which works out (without going into fractions) at 1s. 2d. per head or 2s. 4d. per pair.

Having arrived at the cost of feed, I propose to carry you further, to the total cost of production, including labour, interest, and depreciation on plant, because any calculations, without these items, are incomplete for a commercial computation, and would be to some extent misleading. This works out as follows :—

	s.	d.	
Feed	1	2	
Labour	0	4½	
Eggs	0	2	
Oil...	0	0½	
Fuel for raising	0	1	
Interest and depreciation on plant ...	0	1	
	1	11	each.

That is, the cost of rearing mixed sexes on the above rates of feed, &c., is 3s. 10d. per pair. It should be remembered, however, that present rates of feed are 12½ per cent. higher than those ruling at the time of the experiment. Add this 12½ per cent. to the cost of feed, and we arrive at 4s. 1½d. per pair at present feed values.

As these figures are based upon mixed rearing, the point arises as to the difference in quantity of feed consumed by the cockerels over that consumed by the pullets. I estimate this as 10 per cent., and to balance it I take 5 per

cent. (1½d.) from the feed item of the pullets and add 5 per cent. (1½d.) to that of the cockerels to show the cost of feed in each case. This, then, works out at 4s. 3d. for cockerels and 4s. for pullets on present values of feed—viz., pollard and bran 1s. per bushel, and wheat 4s. per bushel—which items are quite sufficient to represent the staple food likely to be used.

Having arrived at the total cost of production, we can now answer the much-debated question, "Will it pay to rear the cockerels?" and I will now take values likely to be realised for these cockerels under ordinary market conditions, and after very careful review of the prices that ruled during the past three years. I estimate that good well-grown cockerels of heavy breeds -such as Orpingtons, Plymouth Rocks, &c,—weighing 5 to 6 lb. live weight at 5 to 5½ months old, will realise 7s. 6d. per pair; and the lighter sorts—such as White Leghorns—weighing 4 to 5 lb. live weight, and of the same age, will average 5s. 6d. per pair. If we deduct 6d. per pair for freight and selling charges—which is well over the mark, in the case of suburban breeders, at any rate—this will leave 7s. and 5s. respectively, showing a net profit of 2s. 9d. and 9d in each case.

These figures will, doubtless, be questioned; but let anyone doubting them endeavour to purchase cockerels at the weights mentioned for the ages in question, and see the result! Not only will it be found that they will have to pay these prices, but they will also discover that the figures quoted are rather under, than over stated; and, further, it might be mentioned that there is at any time, even while our markets are reported to be over supplied, a scarcity of this class of prime table poultry, and the reason of it is that poultry-farmers are treating their cockerels as a by-product rather than as a profit-making proposition, which they undoubtedly are, provided the right development is secured and the birds are kept to the right age, viz., 5 to 5½ months old. Younger birds weighing less than these can scarcely be classed as table poultry.

I have no hesitation in giving it as my opinion that if a greater number of the class indicated was in regular supply, there would be a very great increase in the consumption of this article of diet. It is the miserable, half-grown, weedy specimens that choke up our markets that are the real bar to a thriving business in table poultry. Another point that I wish to emphasise is, that weights above those quoted, or older birds than those indicated, are undesirable, and will accordingly recede in value.

It should be understood that I am not now dealing with the class known to the trade as "broilers." Undoubtedly, high prices are obtained for birds of this description at very tender ages early in the spring; but as soon as November is reached, there are far too many birds of this class sent in, and they become a drug upon the market. This is where the line must be drawn if the best results are to be obtained. It will be observed that my figures presume the lighter breeds to be as heavy feeders as the heavy kinds. I admit that this is open to some difference of opinion, and needs an exact experiment to elucidate it. At the same time, observation leads me to the conclusion that there is very little difference in the amount of feed consumed

by the heavy and medium-light breeds, at any rate. This at first sight might appear untenable, but it must be remembered that there is a great difference in the activity of the two kinds under review, because the heavy breeds are slow in movement, and tend to put on frame and flesh, while the lighter breeds, by superabundant energy, use up much more food in proportion to their weight, and the difference, if any, is less than might be expected.

Further, I assert, not as a matter of opinion, but as a fact demonstrated by actual experience and practice, that, brought to the right ages and weights, under ordinary commercial conditions as at present prevailing, and with ordinarily good plant to handle them, the cockerels will pay to rear. My advice is, do not wait for reputed dear seasons, or dispose of the birds because they are in your way, but dispose of them only when they are just ready, and by doing so make a name for table poultry, as you must do for your eggs, if the highest prices are to be secured.

I now come to the value of the pullet—that is, the female under twelve months old. If our laying competitions have more clearly demonstrated one phase of the layer than another, it is her commercial value. Yet the most vague notions are entertained on this point, and one often hears a demur at the prices asked by breeders for their good laying pullets; but actual experience—not less than the figures referred to amply prove that while the cost of rearing a pullet to 5½ months old is in the vicinity of 2s., her commercial value at that age from a productive point of view, if hatched between July and October, and if well developed and of decent strain, is certainly not less than 8s to 10s., and well selected pullets might be worth a much higher price per head.

All the figures in this paper are based on the presumption that the birds are of good strains, hatched between July and 30th September, handled by experienced poultrymen with proper equipment.

Manchurian Millets at Grafton Experiment Farm.

In connection with the growing of the Hsiao mi Yellow and Hsiao-mi White Manchurian millets at the Grafton Experiment Farm, Mr. A. H. Haywood, the manager, states that these have been grown since 1910, and have always given most satisfactory results. In his opinion they are the most valuable millets grown for either fodder or seed. This year they were sown on 26th January, and at the flowering stage, which started on the 25th March, the estimated yield of green stuff was 10 tons per acre. Each variety subsequently yielded 11 bushels of seed per acre. The yellow variety, however, generally gives the largest yield of seed. He considers them very valuable as catch-crops, as well as heavy fodder yielders.

Seasonable Work for Poultry-keepers.

JAMES HADLINGTON.

AUGUST.

THE hatching season will now be in full swing. This is one of the busiest months on the poultry farm, and next to the quality, the proper mating and supervision of the breeding stock—caring for the chickens is the most important work on the farm. This is the foundation upon which depends success or failure. Rearing and management of chickens has formed the subject of a special article in a previous issue; there is thus no need to go over that ground again in these notes. But it cannot be too strongly emphasised that even when rearing in a small way, the best equipment obtainable for it is none too good, and whatever is done should be carried out thoroughly and systematically, whether it be in caring for a hen and her brood, or the manipulation of larger numbers. The day of slipshod methods is passing, no less in connection with poultry-raising than in any other pursuit. These are days of larger earnings, and such are only obtainable with wider knowledge and better equipment. A recognition of this fact will go far towards putting poultry-keeping upon a better footing.

A Warning to Beginner

In my travels of inspection in the different poultry-rearing districts during the latter part of last hatching season, one thing was in strong evidence. This was the attempt in many places to rear more chickens than proper equipment was provided for, and the result in most cases was disastrous. The waste of chicken life, money, and energy of the would-be poultry-raiser was enormous. Such a state of things is unhealthy for any business. There is perhaps no branch of production more antagonistic to the "get-rich-quick" idea than that of poultry rearing. The attempt to rear more chickens than can be properly accommodated and cared for is sure to end in loss and disappointment. Breed or strain, while important, are of much less value than successful rearing and good development. There should be no question of laying hens paying, when receiving ordinarily intelligent attention, even with rough and ready accommodation; but rearing is the foundation upon which all else is to be built.

The Care of the Breeders.

In respect to caring for the breeding stock, utility poultrymen would do well to copy some of the methods adopted by successful exhibition breeders, and pay increased attention to individuals in the breeding pens, particularly on the male side, to keep the birds in good healthy breeding condition. Unfortunately, for many beginners, these lessons are only learned (if at all)

after perhaps two or three seasons of partial failure in hatching and rearing. They start out, having, in many cases, secured what appeals to them as the best strain of the most likely breeds, and in some cases little fault would be found with this part of the arrangement, yet, for want of experience in handling their stock, they fail to achieve good hatching results, and, in many cases, the real trouble is altogether unsuspected. For instance, if one looked in upon some breeding pens, and advised that the male bird was being starved, he would be met with indignant repudiation of such an assertion. Yet this is exactly what often happens, even when the owner is what may be described as a good feeder. But his rooster is not, and that is where the trouble comes in. What happens is that many good stock birds are over-gallant, and will incessantly call the hens to feed, while they themselves strut around and eat little or nothing. By the time the breeding season is just in full swing, such birds have become emaciated and weak, and the fact of the bird having appeared vigorous and active has deluded the owner into a false estimate of its fitness for the pen. Many such cases have been met with in the course of my travels, which experience at once detected as one of the principal causes of failure to hatch or rear successfully. In short, the weakness was due to the parent birds. To obviate this trouble, constant vigilance is necessary on the part of the attendant, and as soon as this kind of thing is detected, all such birds should receive special attention. The successful exhibition or stud poultry breeder generally has his birds under such control that they will eat out of his hands. This is taken advantage of to give the male bird an extra feed during the day, or to feed him by himself at feeding-time. This, however, is not always practicable with the utility breeder, since taming his birds is not such a feature as with the exhibitor; therefore, he lacks that advantage. But, if good hatching results are to be obtained, some system by which these over-gallant birds can be better fed must be adopted, or it will be necessary for them to be removed from the pen until again fit. It will be averred by many utility men that they have not time for this kind of thing; then I can only say that, if that is the case, they certainly have not time to become successful poultry raisers.

To sum up the position, the essentials for success are that all weak, weedy, or inbred specimens should be eliminated from the breeding pens, and that a hen's fitness for the breeding pen should be judged by her capability to lay eggs that will produce good, strong, virile chickens, and not alone by the number of eggs she has laid.

At this stage of the poultry industry, it is necessary to call attention to the need for more stamina and better development, and these can only be secured from good, strong stock, well cared for, and chickens reared under better conditions than in the past. Attempts to handle more chickens than good accommodation is provided for can only end in overcrowding, and unhealthy conditions generally, which lower the vitality and result in weak, poorly-developed stock, subject to all the diseases that chickendom is heir to. Fewer numbers and more quality will be found to produce more profits in the case of very many poultry-keepers, and will result in far less disappointment.

Green Feed for Chickens.

The necessity for making provision for a supply of green feed for the growing stock should not be lost sight of. Lucerne is, of course, about the best, where it is available; but, unfortunately, it cannot be grown in many places where poultry-farming is carried on, but in most localities it is practicable to grow rape and kale, which can be recommended. Rape can be sown in well-prepared soil, and be fit to feed chickens in a few weeks. While rape should, under ordinary conditions, be sown in the autumn, to give the greatest bulk of feed, a spring sowing provides a valuable addition to the diet of the young chicks, and acts as a tonic as well.

The method suggested is to sow thickly and thin out, and give to the chickens as the plants grow. Sowing broadcast, at the rate of 15 lb. per acre, will provide a good stand. This works out at the rate of 1 lb. for a patch 32 yards by 10 yards. Sowing should not be continued later than the end of August in the hotter parts of the State.

Thousand-headed kale can also be sown for the purpose, at the rate of 10 lb. per acre, and sufficient of the plants transplanted out, 3 feet x 2½ feet, into a larger area, to meet the requirements of the grown fowls at a later date.

Almost every poultryman recognises the value of green feed for his stock, and laying hens and growing stock alike consume large quantities. A feature in this, too, is that chickens brought up to eat plenty of green feed will consume more in later life, not only to their advantage in health and productiveness, but the result is a large saving of the feed bill when green feed is abundant.

The American *v.* Australian Fruit Case.

In the May number of "Better Fruit," there appeared an article on Foreign Markets for Oregon Fresh Fruits, compiled from Consular reports by Stewart F. Lamb, under the direction of Hon. H. B. Miller, Vice-President of the Oregon State Horticultural Society, in which the fresh fruit trade with the different foreign countries is very fully dealt with.

In the remarks regarding trade with Germany, it is claimed that Australian apples land in that country better than Pacific Coast American-grown apples, and are preferred to the latter. The statement is made that the American case is not strong enough to carry a distance of 7,000 miles, and that their fruit very often arrives in a bruised condition. It is urged that shippers should provide stronger boxes, remembering that the cases must be dropped over the side of arriving vessels in chain slings, so that the frail boards are subjected to great pressure, and even when they do not break, frequently yield, thus bruising the contents—an injury naturally reflecting on the prices realised for the fruit.

Cheese-making on the Farm.

MATTHEW WALLACE, Dairy Instructor.

SLOWLY the old order giveth place to the new, and the erection of new buildings more suited to modern requirements is an encouraging sign of the times.

All along the South Coast districts where cheese-making has long been an established industry, there are many cheese factories, both private and co-operative, which cannot altogether be described as fully up to present-day standards, more particularly those portions of the buildings used for the curing of the cheese.

There has recently been erected for Mr. J. T. Bateman, on his farm at Buckago, near Bega, a cheese factory constructed of hollow concrete blocks.

These blocks, which can be manufactured wherever clean sand is available, are 8 inches in thickness, and can be produced at a moderate cost. They seem admirably adapted for this class of work.

The building, which is designed to treat anything up to 500 gallons of milk daily, is 50 feet in length and 20 feet wide, while the walls are 12 feet high.

The making-up room is 20 feet x 20 feet, and the curing-room 30 feet x 20 feet. The floors are of concrete throughout, and the ceiling lined with iron. There is a 6-foot verandah with a concrete floor all round the building.

Provision is made for cooling the milk by water from an underground tank, a circular milk cooler being used for the purpose.

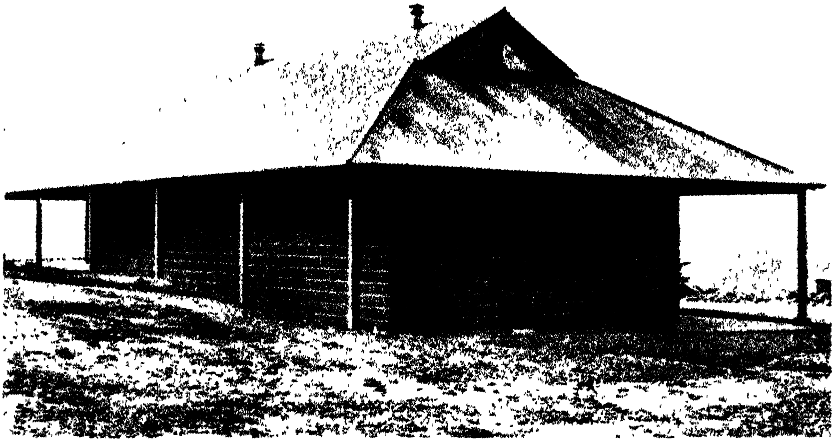
The plant and fittings are in keeping with the building. The cheese hoops are of the latest pattern, and the continuous-pressure cheese-press is the first of this type to be used in the district.

Steam is provided by a 4 h.p. boiler situated close to the factory.

Mr. Bateman is to be congratulated on his enterprise, and considering that the farm is situated in one of the best districts for producing fine-flavoured milk, we may expect soon to see another special brand of cheese on the market.

HOW TO PREVENT A COW FROM SUCKING HER OWN MILK.

A CORRESPONDENT recently asked advice on this subject, and in reply the Herdmaster to the Department stated that it is seldom that a cow will give up this habit before she is nearly dry. No cure is known, and it can only be prevented by the aid of mechanical appliances. One method is to use a surcingle and sword stick. The apparatus required consists of a surcingle, headstall, and a piece of round wood about 4 feet long—an old pitchfork handle would be suitable. An auger hole should be bored in each end of this piece of wood, which is then attached by rope or a strap to the surcingle and head collar. Another method is to put a "cradle" on the cow's neck.



Views of a concrete block Cheese Factory. Erected for Mr. J. T. Bateman, Buckago, near Bega.

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

Branch.	Honorary Secretary.
Albury	Mr. J. Brann, "Sylvania," Racecourse Road, Albury.
Baan Baa	Mr. P. Gilbert, Baan Baa.
Balldale	Mr. H. Elrington, Balldale.
Bathurst	Mr. J. McIntyre, Orton Park.
Batlow	Mr. A. C. Arnot, Batlow.
Beckom	Mr. S. Stinson, Beckom.
Borambil	Mr. H. A. D. Crossman, "Homewood," Quirindi.
Bungalong	Mr. G. H. Pereira, "Springdale," Cowra Road, *viâ* Cowra.
Canadian	Mr. C. Smith, Canadian Lead.
Cardiff	Mr. F. B. Cherry, Cardiff.
Carlingford	Mr. D. K. Otton, Carlingford.
Cattai	Mr. A. J. McDonald, Cattai, Pitt Town.
Collie	Mr. C. J. Rowcliff.
Coonabarabran	Dr. F. G. Failes, Coonabarabran.
Coradgery	Mr. J. Clatworthy, Beechmore, Millpose, Parkes.
Coraki	Mr. G. E. Ardill, Bungawalbyn.
Coreen-Burraja	Mr. N. B. Alston, Coreen, *viâ* Corowa.
Courangra	Mr. S. H. Warland, Courangra, *viâ* Brooklyn.
Cowra	Mr. E. P. Todhunter, Cowra.
Crudine	Mr. F. W. Clarke, Crudine.
Cundletown	Mr. S. A. Levick, Roseneath, Cundletown.
Deniliquin	Mr. W. J. Adams, jun., Deniliquin.
Derrain	Mr. A. P. Hunter, Red Bank Creek, Matong.
Dubbo	Mr. T. A. Nicholas, Dubbo.
Dunedoo	Mr. G. E. Alexander, Dunedoo.
Erudgere	Mr. Frank Hughes, Erudgere.
Fairfield West	Mr. J. H. Spargo, Hamilton Road, Fairfield.
Fernbrook	Mr. W. Marks, Yarrum Creek, Dorrigo.
Forest Creek	Mr. W. Thompson, Forest Creek, Frogmore.
Garra and Pinecliff ...	Mr. A. S. Blackwood, "Netherton," Garra, *viâ* Pinecliff.
Gerringong	Mr. J. Miller, Gerringong.
Grenfell	Mr. G. Cousins, Grenfell.
Gunning	Mr. E. H. Turner, Gunning.
Henty	Mr. H. W. Smith, Henty.
Hillston	Mr. M. Knechtli, Hillston.
Inverell	Mr. W. A. Kook, Rock Mount, Inverell.
Jerrara	Mr. A. O. Lane, Public School, Mullengrove, Wheeo.
Jindabyne	Mr. Sylvester Kennedy, Jindabyne.
Katoomba	Mr. C. Wooller, Oliva Park Farm, Katoomba.
Keepit, Manilla	Mr. J. B. Fitzgerald, Keepit, *viâ* Manilla.
Kellyville	Mr. Joseph Nutter, Kellyville.
Kenthurst	Mr. J. R. Jones, Kenthurst.
Lankey's Creek (Jingellic)	Mr. G. J. Nicholls, P.O., Jingellic.
Leech's Gully	Mr. G. Steed, Leech's Gully.
Leeton	Mr. C. Ledwidge, Farm 442, Leeton.
Little Plain	Mr. F. S. Stening, Little Plain, *viâ* Inverell.
Lower Portland	Mr. W. C. Gambrill, Lower Portland.
Mangrove Mountain ...	Mr. G. T. Hunt, Mangrove Mountain, *viâ* Gosford.
Martin's Creek	Mr. P. Laney, Martin's Creek, *viâ* Paterson.
Meadow Flat	Mr. F. J. Brown, "The Poplars," Meadow Flat, *viâ* Rydal.
Middle Dural	Mr. A. E. Best, "Elliceleigh," Middle Dural.
Milbrulong	Mr. O. Ludwig, Milbrulong.
Moruya	Mr. P. Flynn, Moruya.

Branch.	Honorary Secretary.
Narellan	Mr. G J. Richardson, Narellan.
Narrandera	Mr. C. F. Pearce, Narrandera.
Nelson's Plains	Mr. M. Cunningham, Nelson's Plains.
New Italy	Mr. F. A. Morandini, New Italy.
Nimbin	Mr. J. T. Hutchinson, Nimbin.
Orangeville	Mr. C. Duck, Orangeville, The Oaks.
Orchard Hills (Penrith) ...	Mr. H. Basedow, Orchard Hills, *viâ* Penrith.
Parkesbourne	Mr. W. H. Weatherstone, Parkesbourne.
Peak Hill	Mr. A. B. Pettigrew, Peak Hill.
Penrose-Kareela	Mr. A. J. Bennett, "Brookvale," Kareela.
Ponto	Mr. A. D. Dunkley, Ponto.
Redbank	Mr. J. J. Cunningham, Redbank, Laggan.
Ringwood	Mr. Wm. Tait, Ringwood.
St. Mary's	Mr. W. Morris, Queen and Victoria Streets, St. Mary's.
Sackville	Mr. Arthur Manning, Sackville.
Sherwood	Mr. J. E. Davis, Sherwood.
Stockinbingal	Mr. J. Neville, Stockinbingal.
St. John's Park	Mr. J. C. Scott, St. John's Park.
Tallawang	Mr. G. Lincoln, junior, Tallawang.
Taralga	Mr. Dave Mullaney, Stonequarry, Taralga.
Toronto	Mr. J. G. Desreaux, Esmond, Toronto.
Tumbarumba	Mr. R. Livingstone, Tumbarumba.
Upper Belmore River ..	Mr. A. W. Fowler, Upper Belmore River, *viâ* Gladstone, Macleay River.
Uralla	Mr. E. A. Neil, Uralla.
Valla	Mr. A. E. T. Reynolds, Valla, *viâ* Bowraville.
Wagga	Mr. Thos. Fraser, Aberfeldie, Wagga.
Walla Walla	Mr. H. Smith, Walla Walla.
Wallendbeen	Mr. W. J. Cartwright, Wallendbeen.
Walli	Mr. A. V. Bloomfield, Walli.
Wetherill Park	Mr. L. Rainbow, Wetherill Park.
Wollun	Mr. Robert Turner, Wollun.
Wolseley Park	Mr. H. McEachern, Wolseley Park.
Wyan	Mr. C. W. Harper, Myrtle Creek Railway Station.
Wyong	Mr. Edgar J. Johns, Wyong.
Yass	Mr. Cyril Ferris, Yass.

Notice to Honorary Secretaries.

It is important that a record of the meetings of the branches should be inserted in the *Agricultural Gazette*, and honorary secretaries are invited to forward to the Department a short account of the proceedings of each meeting, with a brief summary of any paper which may have been read, and the discussion that followed it, as early as possible after each meeting. Notes for insertion in the *Agricultural Gazette* must reach the Department before the 16th to ensure insertion in the following month's issue.

Insect Pests.—Quite a number of the branches have availed themselves of the Department's offer to supply a set of insects, being the common pests of the district, and the collections are now being cased. The Government Entomologist suggests that as each district has certain pests peculiar to its orchards and gardens, more useful work would be done if the members themselves collected the local pests (orchard, garden, and stock) and sent them to the Department, where they would be arranged, mounted, a descriptive label attached, and returned to the branch. Mr. Froggatt considers that such a collection would have a far greater value, as there would be more interest attached to the specimens when the members knew exactly where the pests came from, and where and how to find them.

Veterinary Lectures.

In connection with the lectures to branches of the Agricultural Bureau, it is herewith pointed out for the information of honorary secretaries that the following is the list of subjects of lectures which can be delivered to them:—

Horses.—(1) Conformation and Unsoundness (with lantern illustrations); (2) Colic and Treatment of Wounds; (3) Strangles, Influenza, and Tetanus.

Cattle.—(1) Tuberculosis (with lantern illustrations); (2) Contagious Abortion and Contagious Mammitis; (3) Ticks, Tick Fever, Tick Infestation and Eradication.

Sheep.—Parasitic Diseases of Sheep.

Pigs.—Diseases of Pigs.

General.—(1) Parturition of Farm Animals (with lantern illustrations); (2) Feeding of Farm Animals and Dietetic Diseases; (3) Sterility: Causes and Treatment in all classes of Stock.

REPORTS AND NOTICES FROM BRANCHES.

Albury.

A meeting of this branch was held on 23rd June, when there was a large attendance of members.

Mr. J. D. Lankester resigned from the position of Secretary, and Mr. J. Brann was appointed his successor, with Mr. H. Eberle as Assistant Secretary.

Mr. Brann gave an interesting and instructive lantern lecture on poultry-rearing.

Canadian.

The text of the paper read by Mr. J. Baldwin at the May meeting of this branch was as follows:—

BUTTER-MAKING IN THE SUMMER TIME.

As it is impossible to make good butter in the summer-time by the old method of setting in dishes, I assume that every farmer has a separator. The cream screw should be set to have cream test 45 to 50 per cent., as cream keeps better when very thick. Butter-makers should not store cream or butter in rusty tins or cans, for to do so means disaster. Stand the cream bucket in a dish of cold water; when separating add a dessert-spoonful of fine salt to each gallon of cream and stir vigorously. Dip a clean chaff-bag in cold water, and fasten round the cream can, the bottom edges of the bag to rest in the water in the dish in which the bucket is standing. Stand in a draughty place until sufficiently cool to place in the receiving can, which should be kept in the same way. Warm cream must not be mixed with cold cream in the receiving can. Stir the cream vigorously three times daily, and churn every second day, in the morning before sunrise. The churn and pats must be thoroughly clean, and should stand in cold water with a wet bag around them the night before, so as to have everything as cool as possible. Churn steadily, as fast churning makes butter softer than if it is churned gently. When the butter has come, drain and wash it in the churn, renewing the water at least four times. It will take ½ oz. of fine salt to one pound of butter. A large shallow dish is the best for salting in; work the salt thoroughly in with pats, going over it at least three times; work up again next morning. There are two reasons for this second working: First, there would be too much water in the butter; and, second, the butter would be mottled or streaky. If good well water is not procurable, it is necessary to have a good water bag, holding 6 gallons, filled over-night, and hung out in the open to catch any light breeze. I have made butter with success through five summers, moulding it into 1-lb. lots, papering, and delivering it round the town of Gulgong, 5 miles distant, in a firm condition, with the temperature up to 110 degrees Fahr. As much as 150 lb. per

week has been dealt with in this way, top prices being obtained all through. The average small farmer has probably much the same conditions to work under as those described. My outfit consists of a dairy 8 feet by 10 feet, double roof and sides, cement floor, separator and churn, milk cans, buckets and dishes, and well water 200 yards from the dairy, but as it has to be carried to the dairy its value is greatly reduced, as it rises 5 or 6 degrees in temperature. Water kept in canvas bags would, I believe, be much cooler.

DEPARTMENTAL NOTE.—The Dairy Expert states that too much salt is added to cream when fresh. This delays ripening, but it also hides the flavour, and the farmer cannot thus well tell the flavour of his cream.

A discussion also took place at the same meeting on the subject of stock on cultivation land. There were present those who favoured and those who opposed the practice, and both sides seemed to hold very decided views on the question.

DO STOCK PAY ON CULTIVATION LAND?

Mr. STAGEMAN stated that in his opinion land used for purely agricultural purposes should not have stock grazed upon it. The ground should not be allowed to grow any kind of fodder at all, and if any was grown it should be ploughed in before it got high enough to feed off. Land growing crops that were grazed became caked and dry, and, when one wanted to work it, probably it could not be done on account of its condition. A man on a small farm of 100 to 200 acres of cultivation and 100 to 150 acres of natural pasture, having the former stocked, in a season that did not turn out as he anticipated, probably had to sell his stock for what he could get for them. Hand-feeding then was out of the question, as, in view of the price of fodder in such periods, a man would be in pocket if he sacrificed the stock and sold the feed.

Mr. BALDWIN instanced an old garden, which had not been tramped by stock, but the weeds in which had been kept down, and the surface continually worked. After three months of dry weather the subsoil on such land would be found damp.

Mr. TAYLOR brought forth evidence from practical men to show that running a good class of dairy cow paid better than fattening large stock, and that grazing dairy cattle or fattening did not pay as well as sheep and cereal crops in conjunction.

Mr. R. HOLLOW said he had raised sheep and lambs on his cultivation land for many years, and considered the grazing off of the rubbish much better than ploughing in, as he had the manure just the same. He had made a good deal out of sheep, and they had paid him better than wheat for the last few years. He had experienced no difficulty in working his land when he wanted to. He did not believe in large stock being grazed, of course, unless there was an abundance of rank feed, and then they should be put in when the ground was thoroughly firm, in the day-time and after the morning dews had dried off. Mr. Hollow quoted returns from sheep and wheat, proving that he was much better off financially by using the sheep on his land than by just letting it lie idle in bare fallow.

Mr. TAYLOR asked Mr. Hollow if he was working on the lines recommended by the Sheep and Wool Expert of the Department of Agriculture (Mr. Mathews).

The reply was in the affirmative, except that he did not cross with the Dorset Horn. He did not care about chancing this cross, on account of changeable years. If seasonal conditions were not favourable for lambs, or the market were a bad one, the Dorset Horn, not being a good wool producer, would not pay to run on. Mr. Hollow stated that if he could not run sheep on his wheat farm he would have nothing to do with it. He also believed sowing crops for the raising of lambs was better than ploughing in.

Mr. STAGEMAN asked, would not growing peas, &c., and ploughing them in be better than feeding off?

Mr. HOLLOW replied in the negative, as he considered that no good would come of that for twelve months, whereas with lambs there was a quick return, and the droppings ploughed in gave a return straight away with the wheat crop.

Coradgery.

On 9th July, a lecture on colic in horses and treatment of wounds was delivered to a good gathering of members of this branch.

Coraki.

A new branch has been established at Coraki, with the following gentlemen as office-bearers:—Chairman, Mr. Charles Patch; Vice-Chairman, Mr. J. P. Stevens; Treasurer, Mr. W. McLean; Hon. Secretary, Mr. G. E. Ardill.

Courangra.

The usual monthly meeting was held at the local post-office on 11th June, when the attendance was good, and much interest was shown in the proceedings. Five new members were elected, bringing the total up to thirty.

A demonstration of pruning and grafting was given at Mr. Austin H. Woodbury's orchard at Spencer, on 13th June, by Mr. J. G. R. Bryant, Assistant Fruit Expert. About thirty-five growers were present, and marked interest was shown in the proceedings. At the conclusion Mr. George W. Hitchcock (Chairman), moved a vote of thanks to Mr. Bryant, stating that he had for several years closely followed Mr. Bryant's system, and was fully convinced of its value. The motion was seconded by Mr. Warland, the Secretary, who made a special appeal for an increased membership.

Fernbrook.

The Secretary of this branch (Mr. W. Marks) read a paper on his experiences with grasses at Fernbrook, at the meeting held on 6th May.

A practical demonstration of pruning was conducted by Mr. W. Le G. Brereton, Orchardist, Glen Innes Experiment Farm, at Mr. D. Woodroof's orchard. There was a good gathering, and a keen interest was evinced in the work.

Hillston.

The monthly meeting of this branch was held at the residence of the Chairman, Mr. W. Cashmere, on 16th May, sixteen members attending. A most interesting and instructive discussion took place on the subject of the class of sheep best suited for small holders in the district. The members were hospitably entertained by Mr. and Mrs. Cashmere.

The paper, from which the following extracts are taken, was contributed by Mr. T. Morant.

The Most Suitable Type of Sheep for the Small Farmer

It seems almost unnecessary to point out the many advantages of a small flock of sheep on the farm, yet very few farmers have given this important branch of stock-raising the attention it deserves. No class of live stock can be handled so cheaply as sheep—no class furnishes such quick returns, or so many sources of profit, direct and indirect. The questions of carrying capacity and feeding are of the utmost importance to the practical farmer, and the first article of the farmer's creed should be "Don't Overstock." With mixed farming methods, breeding ewes should constitute the great majority of the flock; so that it is in May or June when the lambs should be dropped that the carrying capacity of the farm must reach its maximum. The direct profit from sheep depends upon the condition in which the lambs are put on the market, and

the state of the ewes at shearing. Neither must suffer any check. The choice of breeds suitable for this purpose is very limited. It must be a Merino or a crossbred type derived from the Merino. While the lamb is being reared the ewe is growing wool, and it is highly important that this wool should be of the most valuable kind and quantity possible under the circumstances. The object in cross-breeding should be to secure a type profitable at the same time for both wool and mutton. This combination, without first-hand knowledge of local conditions, is difficult to secure, as a cross very successful in one locality might prove a complete failure in another. Length of staple is of first importance where crossbred wools are concerned, and it is also a valuable contribution to weight. Short stumpy fleeces are very unprofitable, and it never pays to keep ewes carrying such fleeces—they should be culled out. The main question for the farmer is, which will give the best returns—(1) The wool clip, or (2) the export lamb trade? The demand for either is great. At present I do not consider that lamb-raising here offers the same inducement as the production of a sheep more fully developed and valuable for its wool and mutton, as the long distances to be travelled to the railway and the long rail journey to the central market almost preclude the idea. Given proper railway facilities I consider this district could compete favourably with any in the State for lamb-raising. As the most suitable class of sheep for farmers' flocks for both wool and carcase, I prefer the Lincoln-Merino cross. Compared with other long-wools the Lincoln has a less attractive body, being somewhat long and gaunt. The bone is coarse and prominent, neck long, and the head large and heavy. It is a true wool type. As might be expected in the case of such a bountiful wool producer, it is not an early maturer. It is thus more profitable during the later periods of life. At an age when other breeds show signs of decline the Lincoln is still in its prime, and adding considerable increase in weight. Select good robust Merino ewes showing quality, and mate with Lincoln rams. The percentage of lambs is very high, it being not an uncommon thing to have 100 per cent. of lambs from this cross. The ewe lambs should be retained for the breeding of the succeeding cross, but the wethers can be carried over and disposed of at such times as they yield the maximum profit. Of course this depends on local conditions, as it might pay to dispose of wether lambs earlier, as the profits from a four or five months' lamb are often greater than if kept for a whole twelve months. I am also strongly convinced that the Romney Marsh strain would be very suitable for this district. Although included among the long-wools it cannot be regarded as an ideal wool producer. However, its hardy constitution nearly compensates for this. It is a very early maturer, and for such duties as are necessary in sweetening up pastures, hardiness of constitution must be considered before excellence of type. I consider that a Romney carrying a lighter fleece, exhibiting a strong bone and well-developed body, will succeed in preference to heavier woolled types. The question to decide is—which pays best, wool or mutton? And the farmer must then work for that. He must remember that it is the proportion between flesh and wool respectively, and total body weight, that determines type. Thus, either weight of fleece or weight of carcase and early maturity may be aimed at, but not both in the same breed. A sheep that will produce a large quantity of wool cannot at the same time yield the maximum quantity of flesh, nor could the economical mutton breed with its earlier maturity be maintained as a profitable wool type.

DISCUSSION.—Mr. SOUTHWELL agreed that the Lincoln-Merino was the most profitable type.

Mr. JOE CASHMERE said that some years ago he mated ninety Merino ewes with a Romney Marsh ram, and from the results of that mating and succeeding experience was of opinion that the Romney Marsh-Merino first cross was the most profitable, but that further crossing was bad.

Mr. HUTCHINSON was of the opinion that the Lincoln-Merino cross was best. The sheep were bad on fences and for straying from home, and he thought there was greater mortality among the ewes in this cross on account of the lambs' large heads, but they were very hardy sheep, and the lambs grew very quickly.

Mr. A. J. CASHMERE agreed that the Lincoln-Merino was the most profitable. The Border Leicester lambs grew quicker than the Lincoln at first, but as a

2-tooth the Lincoln beat them out of sight. His experience did not bear out Mr. Hutchinson's statement about mortality among Merino ewes when mated with Lincoln rams. He favoured early lambing, and considered dropping in February or March safer and more profitable than in June or July. The Shropshire cross produced a splendid lamb, but no good for wool.

Mr. KNECHTLE said he had been on a station where experiments had been carried out with Lincoln-Merino ewes mated with Lincoln, Leicester, and Shropshire rams. The last had produced the most profitable lamb, worth at least 2s. 6d. more than the others. He believed the mortality among the Merino ewes was lighter in the case of maiden ewes than those that had formerly had Merino lambs.

Mr. SOUTHWELL had no hesitation in saying that a Lincoln ram with a Willandra type of ewe was the most profitable cross.

The CHAIRMAN also favoured the Lincoln-Merino cross. The lambs were very hardy, good doers, and not easily frightened. He believed in crossing from pure strains on both sides.

Mr. SOUTHWELL considered it more profitable to dispose of crossbred lambs at four or five months' old when they bring about 12s. per head than to keep them another year and get 5s. or 6s. more.

A hearty vote of thanks was accorded to Mr. Morant for his valuable paper.

Inverell.

The pruning demonstration given by Mr. W. Le Gay Brereton, Orchardist, Glen Innes Experiment Farm, on 3rd June, at Mr. W. Jack's orchard, attracted about twenty enthusiasts, and, as all conditions were most favourable for the demonstration, those who attended had quite a treat at the hands of Mr. Brereton in the first instance, and Mrs. Jack's hospitality in the second.

PRUNING.

Mr. Brereton advised all growers to start pruning operations from the very early stages of the tree. In his opinion the yearling trees from grafts were the most suitable, as the grower could then form the tree properly. He favoured a low head, say, 12 to 18 inches. Before cutting, one should select the buds required to form the future tree and get them nicely round the whip. This would give a well-balanced head. He favoured the tripod system, but a good deal depended on the kind of tree, though in nearly every instance three limbs would be found preferable to four, and four preferable to five. One trouble was always experienced with young trees—they would not make even growth. The free-growing limbs, however, could be pinched to check the growth and regulate the tree.

For facility in spraying, picking, and pruning every part of the tree must be made accessible, keeping useless timber well pruned out. In cutting-back each year one must be guided by the growth and strength of the leaders. If the growth was vigorous and strong the pruner could come well out on them; if growth was stunted he must cut hard to induce growth the following year. In some cases of rapid growth it was found better to just prune out all surplus wood, and not touch the main leaders at all. This acted as a check, and induced the tree to bear fruit.

In answer to a question, Mr. Brereton said that he preferred to prune after the trees were planted out.

With pears and some apples he liked to work on what was called the "double bear" system, *i.e.*, two rows of limbs right round. This had a tendency to spread the tree, as one trouble with most pears and some apples was the tendency to grow too compact. A point a grower should keep in mind was the length to leave the fruiting spurs. If the fruiting buds were nicely formed on the spurs the pruner could shorten them, but in many cases the fruiting buds were right at the end of the spur, and, by cutting, one lost all his fruit. If the tree was a poor "setter," a good few buds should be left; if it set freely, it should be shortened-in well. As he found it very difficult to obtain the very best results from the different varieties by pruning he advised all

growers to experiment a little. Take, say, three trees—No. 1, No. 2, and No. 3. On No. 1 leave the laterals long, on No. 2 shorter, and on No. 3 cut short. The following year one would see the result, which would be interesting and be an excellent guide for the future.

In the evening Mr. Brereton gave a lecture on the subject of diseases in fruit. Mr. J. Ditzell occupied the chair.

Diseases of Fruit Trees.

Mr. Brereton said he had spent a day looking round the district, and, to an outsider it was very pleasing to see the healthy state the trees were in.

The worst pest the orchardist had to contend with was the fruit fly, as it was very destructive and hard to combat, all sprays being useless. The only remedy known at present was concerted action on the part of the growers. This would keep the pest within bounds. The kerosene tin would catch a few, but it was not nearly effective enough. After the fly punctured the fruit to lay its eggs the fruit became decayed and dropped off. The maggots then crept into the ground and the process was repeated. The most essential thing to do was to keep all fallen fruit well gathered up and destroyed by boiling, as it could then be used for feeding pigs. Under no consideration, however, should it be used as feed without first boiling. The fly seemed to have a preference for yellow fruit, and it was impossible to detect the fruit that was affected when first pierced.

The pest next to be feared was San José scale. The great trouble with this pest was that if it were not looked after it would kill the trees right out. The scale itself was very small, but was easily detected. It had the appearance of ashes stuck on the limbs. If the trees were badly affected they should be dug out; if the attack were moderate red oil emulsion would be effective, and would thoroughly clean the tree.

Peach freckle, curl leaf, and all forms of aphis could be combated by thoroughly spraying. The chief sprays are red oil emulsion, Bordeaux mixture, and lime-sulphur. If trees were affected with aphis when the leaf appeared tobacco wash should be used. This would be found very satisfactory, but must be persevered with. The first spraying would kill the outside aphides, then in three days the trees should be sprayed again, and yet again if found necessary. Leaf-eating insects could be poisoned, but for scale or sucking insects one must use a burning substance, such as red oil. For citrus he found fumigating the best method; but the tents were a little costly as the fumes rotted them. February was the time to fumigate, using cyanide of potassium dissolved with sulphuric acid in an earthenware pot. The quantity was regulated by the size of the tree.

At the conclusion of the business portion of the July meeting of this branch, Mr. Ditzell, Assistant Inspector of Agriculture, delivered a lecture on diseases of wheat.

Diseases of Wheat.

Mr. Ditzell prefaced his remarks with a few words about fungi generally. The fungi were a very complex group of thallophytes of low organisation, and comprised the moulds, mildews, rusts, smuts, mushrooms, toadstools, puff-balls, and the allies of each. The fungi were all destitute of chlorophyll, and therefore must get their food as parasites from plants or other bodies. They ranged in size from single cells to systems of entangled threads. The vegetative system consisted of septate filaments called hyphæ. The aggregation of hyphæ into structures of more or less definite form was known as mycelium.

Dealing first with rust, Mr. Ditzell said infection took place through the spores being blown about by the wind, and settling on the growing plants, more especially during the warm, muggy weather in the latter end of October or November. Moisture, warmth, and soft rank growths all favoured the development of rust, but treatment of the seed was useless, and the best preventive measures consisted of feeding off rank growths and growing rust-resistant varieties of wheats. Early wheats were very often rust-escaping.

Infection from "take-all" took place from spores in the ground, the most apparent symptoms being a dark appearance at the base of the plant. If attacked when very young the plants soon withered and died; occasionally a crop might come out in ear and then die, but of course no grain would be found in the head. "Take-all" would only live on certain kinds of plants, the chief being wheat and some grasses, namely, barley grass and spear grass. It must be checked or it would soon spread; and to achieve this the seed should be immersed in a solution of bluestone. Spraying the affected soil with fungicides or turning the land over to pasture were only partially effective; to thoroughly eradicate it the spores must be encouraged to germinate, and they would then die for want of a host plant. This meant fallowing and keeping the fallows clean; also the growing of such crops as oats, maize, and rape, which were immune from attack. Burning the stubble was also helpful.

The next disease was bunt or ball-smut. It was a very well-known disease and was parasitic within the wheat grain itself. At first the bunt balls would be found greasy and evil smelling, but later they became dry and could be squeezed into powder. The presence of this disease could be detected by the ear ripening earlier, and having a distended appearance. About 3,000,000 distinct spores would be contained in a single grain. The spread of this disease could be attributed to many causes. A harvester that had stripped a dirty crop would affect clean seed; so would dirty bags. The loss from this cause was apportioned in various ways; lower value as a milling wheat, and if the disease was very pronounced it was not even poultry feed. It was known that egg production had fallen off immediately infected wheat had been used for poultry, and in some cases the fowls had died. As the infection took place from spores in the ground at sowing time all land should be well worked and the seed treated by immersing in bluestone water. A further immersion in lime water should be given, for where a germination of 70 per cent. would occur with bluestone alone, 80 per cent. would follow the further treatment with lime water.

Flag smut was not very prevalent in the district, but it could easily be identified, for, as the name implied, it would be found on the leaves or flags of the plant. The first symptoms would be the presence of long greyish streaks, which ran parallel with the veins of the leaf. These streaks would gradually become darker and more pronounced, and growth would be seriously affected, the flag at times becoming distorted If a crop was badly infested no grain would be found at all; even a slight attack reduced the yield enormously. This disease was gradually spreading, and reducing the wheat yield in many parts considerably. It might be checked by sowing varieties that would escape the attack. The early maturing varieties seemed the most likely to get it.

By the bluestone treatment of seed all spores would be destroyed, but unfortunately the main infection was from the spores in the ground from the diseased straw; therefore it was most essential to burn off the latter and fallow to induce the spores already in the ground to germinate and then die for want of a host plant. The growing of other crops that were immune from attack, such as oats and maize, should be adopted.

Another bad disease was loose-smut. The spores were loose, and when wind came they were blown away, leaving only the straw behind. As the infection took place at the flowering stage, and the fungus was therefore inside the grain, the use of bluestone was ineffective. The hot water treatment might be used to advantage, but the best preventive was to sow only seed obtained from a clean crop.

Mildew was not a serious disease and would never become one, but it might be worthy of mention. The treatment was to let the sunlight and air into the crop by feeding off rank growth.

In mixing bluestone they should use an earthenware or wooden vessel. Take 1½ lb. of bluestone to 10 gallons of water; tie the bluestone in a little hessian bag and place it in the water just underneath the surface; leave it in over night and next morning it would be all dissolved. For lime water, use 1 lb. of lime to 10 gallons of water.

A vote of thanks was carried by acclamation.

September was fixed for a lecture on maize culture.

Jerrara.

At the invitation of the members of the Jerrara branch, Mr. Major, Assistant to the Sheep and Wool Expert, visited the district on 25th June, and remained for three days, in order to visit the flocks of several members.

The fine Merino, founded on Tasmanian blood, was found to be doing well, and from the results obtained by two small flocks it would have been unwise to recommend any change in the line of breeding.

On the other hand, some of the members were using rams of an inferior type, and this fact, coupled with lack of systematic selection of their young breeding ewes, caused their flocks to be below average standard. Altogether six flocks were inspected, and with the different sheep in the yards Mr. Major pointed out their good and bad characteristics. On the afternoon of the 26th a demonstration with wool was given in the school-room, where a good muster of members had assembled, and where, for the convenience of those who had travelled long distances, the local ladies had prepared tea for all. An early start was made with the lecture on sheep-breeding, illustrated wtih lantern slides.

Everybody was keenly interested, and the Chairman, on behalf of the members, expressed appreciation of the assistance rendered by the Department of Agriculture and for the information they had derived by the visit.

Katoomba.

On 24th June, the splendid weather conditions and the importance of the occasion induced a goodly number of members of the branch and visitors to attend the monthly meeting, when a pruning and grafting demonstration was held at the orchard of Mr. C. Wooller.

The Assistant Fruit Expert, Mr. Bryant, spent nearly four hours in demonstrating methods of handling fruit trees, imparting much information, and answering many questions. It was shown that trees pruned by the expert a year ago now showed a greater number of fruiting spurs as a result, and therefore should give excellent crop returns, absence of pests and climatic conditions, of course, being favourable. By request, various kinds of apple-trees were pruned which had not given good results in some local orchards, and this object lesson should be valuable. The grafting demonstration proved equally interesting, notably the inserting of young wood from a fruit-bearing tree into Northern Spy blight-proof stock; the cutting down of a limb of a tree not bearing well and the grafting of three or four new cuts of young wood, bandages dipped in melted grafting-wax being wrapped around the grafts.

At the conclusion of the demonstration, a meeting of the branch was held, when among other business transacted it was decided to ask the Agricultural Department for the presence of the expert at the annual meeting to be held shortly.

Kellyville.

An address on unsoundness and disease in horses, with a demonstration on the living subject in the afternoon, followed by a lantern lecture on conformation in the evening, was given at Kellyville on the 7th July, by Mr. Max Henry, M.R.C.V.S.

Lankey's Creek.

A branch was formed at Lankey's Creek, Jingellic, on 6th June, with thirty-two members to commence. The names of the office-bearers are:—Chairman, Mr. C. Hope; Vice-Chairman, Mr. T. W. Gadd; Hon. Treasurer and Secretary, Mr. G. J. Nicholls.

Lower Portland.

An address was given by Mr. J. Brown at the meeting of this branch on 15th June.

Rock Melon Culture.

In the course of his remarks, Mr. Brown stated that to produce a good bed of rock melons, the first thing was to select a suitable piece of land in a good position. Unlike water melons, rocks like a good stiff loam, not the stiffest of soil, but land that would respond well to cultivation. The land should be ploughed early, say about June, and left open till nearly spring, when it should be harrowed and ploughed, &c.; it would then be in good order. On no account should the soil be worked while it was wet, for it would then go hard, and out of condition, and in that state it would not produce good crops.

During his experience of forty years, he had found that fowl manure was by far the best. Pig manure and sheep manure were also very good, and stock-yard manure was not to be despised, but he preferred the first-named. To prepare this he dug a hole or ditch of suitable size, and throughout the year put in all the manure from the fowl pens. By spring it was quite decomposed, and second to none for growing rock melons. He had also tried artificial manures, but had had no success with them.

He generally made the drills about 9 feet apart, and the holes 6 feet apart in the drills, leaving only three or four plants in each. By planting this way, he got the vines to properly cover the ground, and last year took 190 gin-cases of fruit off half an acre, to say nothing of dozens that were wasted or given away. When planting, if the ground happened to be dry, he put some water in the hole, and when soaked away placed the seeds in the wet ground and covered lightly. He always "shot" the seed, soaking it for about twenty-four hours and then putting it into a rag-bag, and placing this in the centre of a bag of about a bushel of green stuff cut up into chaff. This would soon heat, and a close watch must be kept as the seed would shoot very quickly and spoil. He had planted seeds with shoots an inch long, but great care was necessary as the shoots were very easily broken off. Like all other crops, thorough cultivation was necessary. As soon as the plants were large enough the plough must be put through, turning the soil away from the rows to let the warmth into the roots, the rows in the meantime being worked by hand with the hoe or pronged hoe. Before the plants were too large the plough should be put through again, this time turning the soil up to the rows; judgment was necessary to determine whether to harrow it down or not. Rock melons were very delicate plants, and great care must be exercised in working through them not to injure the vines, as injury to the vines, especially when young, considerably affected the commercial value of the bed.

For destroying pumpkin beetle, Mr. Brown recommended the use of slacked lime.

Many questions were put to Mr. Brown, who very willingly answered all, and after a lengthy discussion a vote of thanks was accorded him by acclamation.

Narrandera.

The following is the report of the lecture delivered by Mr. T. Wise, at the May meeting, which was held over last month:—

Bulk Handling of Wheat.

Mr. Wise said the question of bulk handling of wheat was essentially a farmer's question, for it would affect the farmer first and last. All others

interested were middlemen. The miller was a middleman, but a necessary middleman. The country miller tried to deal direct with the farmers, and for that reason understood the position better than anyone else. About thirteen years ago he visited the United States and Canada, and whilst there he saw for himself the system of bulk handling in operation. At that time there appeared to be a strong movement in Australia for the adoption of the system, and Railway Commissioners from New South Wales and Victoria were sent over to investigate and report on the system. Their reports were however, very lukewarm, and the system was never adopted. They said it was not applicable to our conditions. Personally, he had found some difficulty in finding out the origin of bulk handling, but one day an old farmer, in reply to a question, said, "Well, stranger, I guess they had to. There was a time when there was a bag famine on the prairies, and the farmers constructed bins for holding their wheat, and the railways accommodated themselves to the new conditions." If bulk handling was no good it stood to reason that when bags became available the American farmers would have gone back to the bag system. But they did not do that. The same thing may one day happen in Australia, for they had to procure all their bags from a foreign country; and the merchants did not, as a rule, order any more than they thought were necessary to hold the crop. That being so, what would happen if they woke up some day and found the harvest very much heavier than they had anticipated?

They were up against difficulties in bringing bulk handling into operation, and one was that the people who took the matter in hand did not know anything about the subject, while the farmers themselves did not take much interest in it. Since the Railway Commissioners went to America the best move towards doing something to establish the system was made by the Government in the last Parliament, when it hired an expert from America to visit Australia and report on the subject. That expert reported in favour of bulk handling all along the line; and now city interests and vested interests were trying to talk it out. From present appearances it looked as if they were likely to succeed, and unless the farmers took the matter in their own hands the report would be put in a pigeon-hole and left there with previous ones. He urged the farmers to take the matter up, for if they did so no Railway Commissioner could prevent them from gaining their object. He had been handling wheat all his life, and in a small way had seen bulk handling in mills, and that was probably one of the reasons he was there that evening.

In America the wheat was harvested with a header, and the wheat was put in bags and then bins. The trouble for the Australian farmer would not arise there; but the question for them was, how were they to get their wheat into the silo at the railway station? Different suggestions were made about that, but the one he favoured most was that the farmer should tip his own wheat. The wheat would have to be bagged; but it had to be bagged now, and he believed it cost the farmers nearly ½d. per bushel to sew up the bags. Under the bulk system bags with a slip-cord were used, the bags holding about 2½ bushels. The farmer carted the bags to the railway station or the mill, and the wheat was there accepted and paid for. The bags were taken away again. If the wheat could not be received at the railway stations here it would be necessary to put up a silo on the farm. It would not occupy one-eighth of the time it now did to load wheat. The larger farmers in America put up silos and an elevator, the size of the silo being 25 x 12 x 12 feet, to hold 1,000 bags of wheat. The wheat was then out of the paddock, and safe from rain and fire. A silo here would cost about £110, and it would last for all time. They would require 200 sacks for holding 1,000 bags. These would cost 7½d. each, or £6 5s. in all. To alter their waggons to carry wheat in bulk would cost about £12. In all the cost would be between £120 and £130. But against that there was the saving in the cost of sewing the bags, the fewer bags required, and other savings amounting to about £30 5s. 10d., or 2.42d. per bushel on a 3,000-bushel crop. Let them take the saving at 2d. per bushel up to that point. But there were other savings to be considered. The farmer had to pay for the losses of wheat through it being stacked on the railway dumps, &c. The silos lost no grain; and moreover, the wheat arrived at its destination in better condition. The millers in England and the other parts of the world would not pay the same price for wheat that had been out in the rain as they

would for dry wheat. If millers could rely upon getting Australian wheat always dry they would be saved the expense and trouble of conditioning it. The losses sustained in that manner were not mere individual losses, but national. If bulk handling of wheat was in operation, those losses would be avoided, and he ventured to say that they would make a difference of 3d per bushel in the price of wheat.

Mr. Wise then went on to describe the system of storing and trucking wheat on the railways in America, which he said was so easy and perfect that one could not realise it unless one had actually seen it. On the railways the wheat was put in the silos, and from there run into the cars built for carrying wheat. The trains, the length of which took two or three days to load in Australia, took about two and a half hours in America. The engine was left on the train, and the cars were run under the spout along which the grain ran into the cars. As soon as one car was filled, the engine moved up to bring the next car under the spout, and so on until the train was loaded. The trains were unloaded in a manner just as easy as they were loaded. In this country the trains stood at sidings about three times as long as they travelled. He had seen miles of trucks waiting at Homebush to be unloaded, and all the time the farmers were crying out for trucks. That was a great loss to the Railway Department. There were a number of objections to the system, but he held that the benefits to be derived would more than justify its adoption.

Speaking on the subject of the grading of wheat, Mr. Wise said the present method of arriving at the f.a.q. for wheat was suitable to the shippers; but he could tell them millers took very little notice of it. He was opposed to the method, for the reason that the district which grew good wheat was brought down to the level of the district which grew inferior wheat. At present, when about three-quarters of the wheat was sold, samples from the wheat-growing districts were procured and mixed together, and from that "hotch-potch" the average standard was arrived at. As against that method he favoured the fixing of grades, which would hold for all time. Farmers would then receive a price for their wheat according to its quality in the English markets.

Mr. W. W. Killen (Barellan) proposed a hearty vote of thanks to Mr. Wise for his interesting address. He had himself visited America and had seen the bulk-handling system in operation, and agreed with Mr. Wise as to its efficacy and applicability to Australian conditions.

Mr. R. J. Elwin seconded the motion, which was carried with acclamation.

The annual meeting of this branch was held on 9th May.

The financial statement showed that the membership was forty-one. The receipts for the year had amounted to £7 19s. 10d., and the expenditure to £5 19s. 11d., leaving a credit balance of £1 19s. 11d.

The report stated that the eight meetings held during the year were satisfactorily attended. Three lectures were given under the auspices of the branch by Government experts: Mr. Chomley, of Yanco Experiment Farm, one on tree-planting; Mr. McKeown, of Wagga Experiment Farm, one on dry and general farming; and Mr. Oliver, of the Stock Department, on colic and worms in horses. Members also paid a visit to Yanco Experiment Farm, which proved of much interest. A committee had been appointed to offer suggestions likely to be useful to the Pastoral and Agricultural Society when it drafted its show schedule, and a number of the suggestions submitted by the committee had been adopted. The branch last year prepared a small non-competitive exhibit for the show, and it was hoped that that good policy would be continued on a more extensive scale. The members could congratulate themselves on a year of very useful work.

The election of officers resulted as follows:—Chairman, Mr. H. L. Tepper; Vice-Chairman, Mr. H. M. Devlin; Hon. Secretary and Treasurer, Mr. C. F. Pearce.

The Secretary moved that in the opinion of the branch the time was ripe for the holding of a congress in each year by the Department of Agriculture, such congress to be held at the time of the Royal Agricultural Show, Sydney.

Seconded by Mr. T. Miners, and carried.

The Secretary made reference to the growing crop competition to be held under the auspices of the P. and A. Society, and hoped the competition would be well supported.

Nimbin.

The usual monthly meeting of this branch was held on 13th June.

Mr. J. MacPherson reported that he had tried the fodder plant *Saccharum officinarum,* which he thought would be better than Planter's Friend. So far not a leaf had been turned by frost, although there had been five consecutive mornings with severe frosts in May, which was unusual for the district. He also mentioned the mammoth cucumber, which he described as a salad, a vegetable, and a fruit—good for pig feed, too.

At a subsequent meeting, held on 4th July, Mr. MacPherson exhibited specimens of the abovenamed fodder-plant, in seed. It looked similar to Planter's Friend, but had eyes at the joints like cow cane. Mr. MacPherson said it could be propagated in sets or from the seed, 4 lb. being sufficient to sow an acre in rows like maize. It stooled out even before being cut.

Orchard Hills.

A pruning demonstration was given at Orchard Hills, on 23rd June, by Mr. J. G. R. Bryant, when about twenty-five orchardists attended.

Mr. Bryant demonstrated the most up-to-date methods of pruning such trees as the peach, plum, apricot, apple, pear, and quince. He also gave examples of the various methods of grafting and budding; after which he explained the various methods of laying out an orchard. He advised growers to go in for wind-breaks on the western side of their orchards, in order to save loss of fruit by strong westerlies, and urged the necessity for feeding fruit trees by a thorough and systematic system of manuring, together with thorough cultivation. They had some of the finest fruit-growing land in the State; and situated as it was, right at the door of the markets, it was growers' own fault if they were not successful. The land, he said, was especially suited to grapes. This was shown by a specimen of a two-year-old grape-vine grown on a wire trellis by Mr. H. Basedow. The growth measured 28 feet in length. Mr. Bryant declared it to be one of the finest specimens he had ever seen.

The Secretary advises that the vine shown, which was 28 feet in length, was taken from a vine that was grafted on Rupestris du Lot in October, 1912, the rootling having been planted the year previous. The variety was Snow's Black Muscat Hambro.

The annual meeting of the branch took place on 6th July, when retiring office-bearers were re-elected for the ensuing year.

Sackville.

At the meeting of this branch, held on 3rd July, an interesting paper was read by Mr. B. Bennett, of Ebenezer, on "Humus and its relation to Nitrogen."

St. John's Park.

The election of office-bearers for the ensuing year was postponed at the recent annual meeting, and the following gentlemen have since been appointed:—Chairman, Mr. A. Ollis; Vice-Chairman, Mr. E. Buckland; Treasurer, Mr. T. Hunt; Hon. Secretary, Mr. J. C. Scott.

Taralga.

The usual monthly meeting was held on 8th June, there being a record attendance, and the greatest interest in the business was evinced.

Mr. Howard had on view some excellent samples of potatoes grown on his experiment plot. Coronation put up the best yield, and Premier gave a fine even sample, one root yielding 17 tubers weighing 12 lb. Mr. Howard was heartily congratulated on achieving such a success in so bad a year.

Mr. H. Twynam gave an interesting and useful rope-knotting demonstration, which was keenly appreciated. A hearty vote of thanks was accorded him.

The meeting then resolved itself into committee to draw up a score card for use in judging an exhibit of local farm produce, for which the branch will give a £10 10s. prize at next show.

A demonstration of pruning and tree-planting methods was given at Stonequarry, near Taralga, on 20th June, under the auspices of the branch, by Mr. Joseph James, of Tallong. There was a very large attendance, and great interest was taken in the proceedings. Old and young trees were treated, and a very clear explanation of the fruiting habits and treatment of trees was given. The method of planting was also shown.

A lecture on fruit-growing was given at night. Mr. James was quite enthusiastic about the possibilities of the district for fruit-growing, suitable soil and sites abounding in every direction. Peaches, he thought, should do very well. Of apples, he would recommend London Pippin (Five Crown), Granny Smith, Jonathan, and Baumann's Reinette.

Walla Walla.

A demonstration of winter pruning and spraying was conducted by Mr. S. A. Hogg, Orchardist, Wagga Experiment Farm, at Mr. E. S. Wenke's orchard, on 9th June. There were about forty-five persons present, most of whom were members of the branch. The Secretary reports that the demonstration was a great success, and proved very instructive.

Wolseley Park.

Mr. H. C. Coggins, Assistant Inspector of Agriculture, was to have given demonstrations of subsoiling with explosives as an aid to tree planting, under the auspices of this branch, on 10th and 11th June, on the farms of Messrs. J. H. McEachern, C. Woodhouse, and T. K. McEachern.

The demonstrations were fairly well attended, but unfortunately recent heavy rains left the subsoil in such a wet state that practical work had, perforce, to be suspended. The demonstrator availed himself of the opportunity to explain the evil results that would follow if explosives were used in wet soil. He said, that when a charge was fired the surrounding soil was compressed extremely

light, the air being excluded, and when it afterwards dried in a hot sun, or in warm weather, it would bake like a brick, becoming harder than ever, thus being in a worse mechanical condition than previously. Moreover, the wall formed by the explosion would be practically watertight, and after heavy rains fell on ground subsoiled when wet, these walls would prevent the escape of rain-water, the result being large potholes resembling, on a major scale, the imprints of animal hoofs in wet or boggy ground. On the other hand, when the work was done in dry soil (the drier the better), the ground, instead of being compressed, was fractured and cracked in all directions, thereby facilitating the penetration of moisture into the subsoil. These fractures did not close for some considerable time; thus, when the subsoil was well fractured at the right time more lasting benefits were derived.

To impress his point, Mr. Coggins went on to say that, if a person were to take two clods, one wet and sticky, the other dry and hard, and place them in position, and strike each a blow with a hammer, the dry clod would be shattered to pieces, while the wet one would show no signs of being struck, save the impression made by the hammer-head where the blow was made. The result in the subsoil was similar when a charge of gelignite was exploded in wet and dry soil respectively.

The teacher and scholars of the Glenroy Public School were present at one demonstration, and the demonstrator simply and carefully explained for their benefit the uses, handling, and firing of gelignite in subsoiling. He also explained and carefully illustrated the danger attached to its use, and the care necessary to avoid disaster.

M. S. A. Hogg, Orchardist, Wagga Farm, also gave pruning demonstrations at Wolseley Park on the 17th June.

The annual meeting of this branch was held on 20th June, when the following office-bearers were elected for the ensuing year:—Chairman, Mr. T. P. McAuliffe; Vice-Chairman, Mr. Jeff Downie; Hon. Secretary and Treasurer, Mr. Hugh McEachern.

The Secretary reported that the branch had had a fairly successful year, from both an educational and a social standpoint.

Lectures and demonstrations were given during the year by various officers of the Department of Agriculture, including a veterinary lecture, demonstrations of the use of explosives in subsoiling, pruning demonstrations, and demonstrations of the preparation of wool clips for market.

The Growing of Canary Seed.

A Tamworth correspondent, who wished to plant an acre of canary seed and had the ground and seed ready, recently asked the Department which was the proper season to sow it. He had not sown before because he had been told that the frost would kill the plant.

In reply, the Agrostologist stated that the seed was best sown in the autumn. The frosts do not materially affect it, and it makes the best growth in the spring months. The harvesting of the seed takes place in November and December.

Orchard Notes.

W. J. ALLEN.

AUGUST.

DURING the month both deciduous and citrus fruit growers will be as busy as the proverbial bee. In the bearing orchard spraying and ploughing should not be delayed a moment. Owing to the windy conditions generally prevailing at this time of the year, both these operations have to be attended to without delay. To expedite spraying, a very early start in the morning must be made, as at this time the wind is not so severe. With ploughing, every ounce of moisture conserved goes a long way towards encouraging full size in the fruit, so that the necessity for haste is obvious.

The planting of young orchards is a big factor in the fruit industry of the future. Unlike farm crops, which are more or less of a temporary nature, the orchard stands for at least a generation. Any extra time expended during the initial stages cannot be overestimated: therefore, no detail in the thorough care of the trees at planting should be considered a trouble.

One item in orchard planting that should not be neglected is shelter. If a natural windbreak is not available, then no time should be lost in providing an artificial one. For this purpose *Pinus insignis*, almonds, walnuts, sugar gums, osage orange, &c., all have their place in the districts suitable for their growth.

Spraying.

Winter spraying should be commenced with the lime-sulphur solution, which is both an insecticide and a fungicide. The formula recommended by the Department was fully referred to in the July issue. Keep a sharp outlook for aphis on peach trees. Resin and washing soda, tobacco-wash, or red oil emulsion will be found useful in keeping this pest in check. Also keep a sharp lookout for the appearance of woolly aphis, mussel scale, and San José scale, and should any trees be found affected they should be carefully pruned, removing and burning as many of the infested twigs as possible. Spray thoroughly with red oil emulsion. See Farmers' Bulletin, No. 72, for spraying formulæ.

Manuring.

Growers who intend using quick-acting fertilisers should make the first application this month. It is better not to apply too much at one time, but rather make two applications—one now, and one after the fruit is set. Spread the fertiliser well through the rows, taking the outer fringe of foliage as usually a good guide as to where to commence sowing the manure. In the drier districts, where late rains are uncertain, it is better to make the application early than late, as it is well known that they do not give the

same results if applied when the soil is at all dry. Regular light annual dressings of from 3 to 5 cwt. per acre should be the rule of the orchardist. In light poor soils, where trees are in full bearing, at least 10 cwt. per acre should be applied. For further information see Bulletion No. 79, "Manuring of Orchards," free on application to the Department.

Grafting.

The latter part of this month is a good time to start the grafting of deciduous nursery stock, and should there be any unprofitable apple, pear, or other trees standing in the orchard, these also may be grafted to good varieties. Scions should be cut from proved bearing trees.

Cover Crops.

Green manures should be ploughed under, so that the plant food locked up in them may be made available when the tree requires it to mature its fruit. If the crops are allowed to remain until the land becomes dry, it will be found impossible to plough it, to say nothing of turning the crop under; and the chances are that, instead of doing good, the opposite effect will result. The moisture, in place of being conserved, will have been taken up by the crop, in consequence of which the soil will have become hardened. When ploughing is attempted, the ground will break apart in lumps, and it will be found impossible to turn the crop under, which will thus dry up instead of rotting as it should.

In hot, dry districts the crop may not be fit to plough in until the end of the month, but no time should be lost in turning it under as soon as it is ready.

Pruning.

This work should be completed this month, care being taken in the performance of the work to see that the limbs are evenly spaced, and due regard should be given each variety in order that they may be pruned in such a manner as will ensure their giving the best results. In the case of extra strong-growing deciduous trees, very light pruning should be given if the trees have been well formed, and are from 5 to 8 years of age. Citrus trees should be pruned this month if possible.

Swabbing Vines.

Vines should be dressed with either a sulphate of iron solution and sulphuric acid, or the latter alone. The dressing is applied to the new spurs or canes by a brush or swab.

It is surprising how few orchardists grow table grapes even for their own use. There is nothing more refreshing in the summer time than a bunch of grapes, and every orchard should contain a small plot. Good varieties to grow in a cool district are as follows:—*White*: Doradillo, Gordo Blanco, and Ferdinand de Lesseps; *Black*: Black Hambro, Black Champion, Blue Imperial and Muscat Hambro.

Harvesting.

The marketing of citrus fruit will continue. Mandarins should not be left too long on the trees, as in many cases they become puffy, and consequently are not so valuable. The packing and grading of citrus fruits requires more care by growers. A simple and most effective way of grading and packing is made possible by placing the fruit in diagonal rows in the case.

Planting.

The planting of deciduous trees should be completed as early as possible this month. The earlier a tree is planted in the winter the better it usually does, particularly if the spring should prove a dry one. The later planted trees will in all probability make a much weaker start than those planted earlier in the winter.

Citrus trees of all kinds can be planted out this month, though in frosty situations the planting should be left until all danger of late frosts is over. Be careful in planting that the trees do not suffer from lack of moisture at the roots. Any damaged or broken roots should be neatly cut off, so that the growth of new tissue will be assisted. Broken roots are a source of white ant infection. Cut the trees well back when planted, and mulch the surface with well-rotted straw or stable manure.

Repairs.

Preparation should be made for the forthcoming spring and summer work. Implements should be repaired, painted, and readjusted. Fences should be repaired, especially the netting, as rabbits and hares are usually prevalent at this season. Spray-pumps require urgent attention—valves should be cleaned, and the whole outfit got into working order.

Ploughing.

This work should be completed as early as possible so as to conserve soil moisture. Land amongst such trees as cherries, apricots, and early peaches must be worked up early now so as to retain the necessary moisture with a view to getting size into the fruit.

Codlin Moth.

Keep all fruit houses as clean as possible, as they are no doubt responsible for harbouring a great many moths during the chrysalid stages. When pruning and spraying, the old crotches, rough bark, &c., should be searched for the pupæ of the moth, as these are the first to hatch out in the spring.

Department of Agriculture, Sydney, 3rd August, 1914.

To stand the season at Hawkesbury Agricultural College, Richmond, the Pure-bred Imported Clydesdale Stallion,

ROYAL WARDEN (16045) C.S.B.

Royal Warden is a rich bay, showing good quality, combined with substance. He possesses an excellent temper. He was imported in 1912, from Scotland, by the Government of New South Wales. Bred by James Merson, Craigwillie, Huntly, Aberdeenshire. He was awarded first and champion prizes at the Royal Agricultural Show, Norwich, England, 1911.

Sire: Everlasting (11331) C.S.B.
1st Dam: Gem of Craigwillie (21597) C.S.B., by Prince Thomas (10263) C.S.B.
2nd Dam: Lady Edith of Craigwillie (15687) C.S.B., by Prince of Carruchan (8151) C.S.B.
3rd Dam: Jean of Northfield (18564) C.S.B., by Star of the North (2435) C.S.B.
4th Dam: Cowden Jean (19435) C.S.B., by Clydesdale Jock (1415) C.S.B.
Foaled 15th April, 1908.

Fee: Five guineas per mare, or any number over two from the one owner, at £4 4s. each.

By arrangement with the Principal, a limited number of mares may be taken at agistment at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE PRINCIPAL,
Hawkesbury Agricultural College,
Richmond, N.S.W.

To stand the season at Wagga Experiment Farm, the Imported Pure-bred Stallion,

CLANDALE (14628) C.S.B.

Clandale is a beautiful bay horse of substance, and most exceptional quality. He possesses the best of legs and feet. He was bred by Wm. Cochrane, Port Logan, Wigtonshire. He was awarded first prize at Aberdeen Show, Scotland, 1912.

Sire: Allandale (12418) C.S.B.
1st Dam: May Logan (21199) C.S.B., by Prince Robert (7135) C.S.B.
2nd Dam: Haidee (21198) C.S.B., by Prince of Wales (673) C.S.B.
3rd Dam: Jess of Portlogan (3145) C.S.B., by Lofty (460) C.S.B., by Hercules (378) C.S.B.
4th Dam: Kate.
Foaled May 10th, 1907.

Fee: Five guineas per mare, or any number over two from the same owner, at £4 4s. each.

By arrangement with the Manager a limited number of mares may be taken at agistment at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE MANAGER,
Experiment Farm, Bomen, Wagga Wagga.

To stand the season at Cowra, the Pure-bred Clydesdale Stallion,

ROBIN ADAIR (16013) C.S.B.

Robin Adair is a big upstanding horse of great substance. He shows good character and good temper. He was bred by Thos. Lean, Wester Deans, Leadburn, and was selected by the Clydesdale Association to represent the breed at the Olympia International Horse Show. He was imported in 1912 by the Government of New South Wales.

Sire: Royal Walter (13717) C.S.B.
1st Dam: Rossie (19808) C.S.B., by Alexander Everard (14242) C.S.B.
2nd Dam: Bell of Western Deans (14652) C.S.B., by Prince of Brunstone (9977) C.S.B.
3rd Dam: Darling of Wester Deans (14651) C.S.B., by Top Knot (6360) C.S.B.
4th Dam: Blossom of Wester Deans (14649) C.S.B., by Stonelaw Lord-Lyon (2400) C.S.B.
5th Dam: Bell of Westside (23030) C.S.B., by Pride of Kyle (3904) C.S.B.
Foaled May 30th, 1909.

Fee: Five guineas per mare, or any number over two from the one owner, at £4 4s. each.

By arrangement with the Manager, a limited number of mares may be taken at agistment, at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE MANAGER, Experiment Farm, Cowra.

Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull.	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn ...	Imperialist ...	Florio	Lady Nancy of Minembah.	Berry Farm ...	*
" ...	The Irishman (imp.)	Tipperary Bull	Colleen Bawn (imp.)	Berry Farm ...	†
Jersey ...	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Yanco Farm ...	*
" ...	Trafalgar ...	Best Man ...	Rum Omelette	Cowra Farm ...	*
" ...	Kaid of Khartoum	Sir Jack ...	Egyptian Belle	H. A. College ...	*
" ...	Leda's Retford Pride.	Dinah's Lad ...	Leda's Angel..	Wagga Farm ...	*
Guernsey ...	The King's Mirror	Calm Prince ...	Vivid (imp.)...	Wollongbar ...	†
" ...	Star Prince ...	Calm Prince ...	Vivid (imp.)...	Casino	21 Oct., '14.
" ...	Sky Pilot ...	Prince Souvia ...	Parson's Red Rose (imp.).	Maclean	11 Jan., '15.
" ...	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (6509)	Inverell	5 Oct., '14.
" ...	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	*
" ...	Claudius (imp.)	Golden Star II..	Claudia's Pride (imp.).	Murwillumbah ...	1 Jan., '15.
" ...	George III ...	King of the Roses	Calm 2nd ...	Mullumbimby ...	31 Mar., '15.
" ...	The Peacemaker	Calm Prince ...	Rose Petersen	Wollongbar ...	*
" ...	King of the Roses	Hayes' King ...	Rosey 8th (imp.).	Pambula	31 Dec., '14.
" ...	Lauderlad ...	Laura's Boy ...	Souvenir of Wollongbar	Casino	3 Sept., '14.
" ...	Belfast	King of the Roses	Flaxy 2nd ...	Tyalgum	28 Nov., '14.
" ...	Royal Preel ...	Itchen Royal ...	Hayes' Lily du Preel (imp.).	Tyalgum	30 Nov., '14.
" ...	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Frederickton	— Sept., '14.
" ...	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	Paterson-Vacy .	11 Sept., '14.
Ayrshire ...	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose...	Grafton Farm ...	*
" ...	Wyllieland Bright Lad (imp.)	Wyllieland Gleniffer (7229)	Wyllieland Sangie	Glen Innes Farm..	*
" ...	Isabel's Majestic	Majestic of Oakbank.	Isabel of Gleneira.	Grafton Farm ...	*
Kerry... ...	Rising Sun ...	Bratha's Boy ...	Dawn ...	Bathurst Farm ...	*

*Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed.

Department of Agriculture,
Sydney, 3rd August, 1914.

BULLS FOR SALE

AT BERRY EXPERIMENT FARM.

HOLSTEIN.—Colonel Neitenstein (355): date of birth, 26th April, 1912; colour, black and white; sire, Neitenstein, by Hollander; dam, Marjorie, by Chairman; g d Margaretha (imp.), 10,439; dam of sire, Dutch Oven by President. Price, **£15.**

Milk yields of dams :—	Milk lb.	Fat per cent.	Butter lb.
Marjorie	5,030	...	224
Margaretha (imp.)	10,990	..	407
Dutch Oven	8,671	3·6	365

GUERNSEYS.—Mountain Prince (593): date of birth, 12th January, 1913; colour, lemon and white; sire, Calm Prince; dam, Angelica 8th (imp.). Price, **30 guineas.**

Rohais' Lad (601): date of birth, 18th March, 1913; colour, lemon and white; sire, Calm Prince; dam, Rohais' Lassie (imp.). Price, **40 guineas.**

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Rohais' Lassie	5,537	5·1	333

Othello (605): date of birth, 4th April, 1913; colour, lemon and white; sire, Trengwainton Village Favourite (imp.); dam, Desdemona 8th (imp.). Price, **35 guineas.**

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Desdemona 8th (imp.)	6,721	4·3	340

AT WOLLONGBAR EXPERIMENT FARM.

GUERNSEYS.—Sweetheart's Fido (398): date of birth, 8th March, 1913; colour, dark orange, little white; sire, Hayes' Fido (imp.); dam, Sweetheart, by The Admiral; g d, Souvenir of Wollongbar, by Vivid's Prince; g g d, Souvenir (imp.). Price, **30 guineas.**

Milk yield of dam :—	Milk lb.	Butter lb.
Sweetheart	4,962	255

Game Boy (407): date of birth, 27th July, 1913; colour, fawn and white; sire, Beaucaire's Baby; dam, Dido, by Royal Preel; g d, Miss Clatford (imp.), by Clatford Hope 2nd (1814 E.S.H.B.); g g d, Clatford Hopeful (imp.) (6811 E.S.H.B.). Price, **25 guineas.**

Milk yield of dam :—	Milk lb.	Butter lb.
Dido	5,000	262

GEORGE VALDER, Under Secretary, and
Director of Agriculture.

STALLION PARADES.

Date.			Place.	Time.
Monday,	17	August	Ardlethan	3 p.m.
Tuesday,	18	,,	Richmond	11 a.m.
Wednesday,	19	,,	Dural	11 a.m.
Thursday,	20	,,	Penrith	11 a.m.
Friday,	21	,,	Luddenham	Noon.
Monday,	24	,,	Dubbo	10 a.m.
Tuesday,	25	,,	Raymond Terrace	Noon.
,,	25	,,	Gilgandra	2 p.m.
Wednesday,	26	,,	Gulargambone	2 p.m.
Thursday,	27	,,	Coonamble	2·30 p.m.
,,	27	,,	Muswellbrook	3 p.m.
Friday,	28	,,	Denman	10 a.m.
Saturday,	29	,,	Scone	9 30 a.m.
Tuesday,	1	September	Canowindra	11·30 a.m.
,,	1	,,	West Maitland	12·30 p.m.
,,	1	,,	Crookwell	10 a.m.
Wednesday,	2	,,	Cowra	10 a.m.
,,	2	,,	Gunning	10 a.m.
,,	2	,,	Tamworth	10 a.m.
Thursday,	3	,,	Lyndhurst	3 p.m.
,,	3	,,	Singleton	2 p m.
,,	3	,,	Yass	10 a.m.
Friday,	4	,,	Burrowa	10 a.m
Monday,	7	,,	Dunedoo	2 p.m.
Tuesday,	8	,,	Newcastle	2 p.m.
,,	8	,,	Goulburn	10 a.m.
Wednesday,	9	,,	Gulgong	10 a.m.
Thursday,	10	,,	Mudgee	10 a.m.
Friday,	11	,,	Barraba	Noon.
,,	11	,,	Rylstone	10 a.m
,,	11	,,	Liverpool	11 a.m.
Saturday,	12	,,	Manilla	10 a.m.
Monday,	14	,,	Gundagai	8·40 a.m.
,,	14	,,	Adelong	2·30 p.m.
Tuesday,	15	,,	Oberon	10 a.m.
,,	15	,,	Wollongong	11 a.m.
,,	15	,,	Tumut	2·30 p m.
Wednesday,	16	,,	Bathurst	10 a m.
,,	16	,,	Blayney	3·30 p.m.
Thursday,	17	,,	Millthorpe	11·30 a.m.
,,	17	,,	Kiama	12·30 p.m.
,,	17	,,	Dapto	3·30 p.m.
Friday,	18	,,	Nowra	10 a.m.
Tuesday,	22	,,	Milton	10 a.m.
,,	22	,,	Wyong	11 a.m.
Wednesday,	23	,,	Moruya	10 a.m.
Thursday,	24	,,	Gosford	11 a.m.
Friday,	25	,,	Cobargo	10 a m.
,,	25	,,	Camden	11·30 a.m.
Saturday,	26	,,	Bega	10 a.m.
Monday,	28	,,	Tenterfield	11 a.m.
Tuesday,	29	,,	Tumbarumba	11·30 a.m.
,,	29	,,	Nimitybelle	10 a.m.
,,	29	,,	Guyra	10 a.m.
Wednesday,	30	,,	Bombala	Noon.
,,	30	,,	Glen Innes	10 a.m.
Thursday,	1	October	Armidale	10 a.m.
,,	1	,,	Braidwood	10 a.m.
,,	1	,,	Cooma	10 a.m.
Friday,	2	,,	Walcha	2 p.m.
,,	2	,,	Queanbeyan	10 a.m.
,,	2	,,	Berridale	11 a.m.
Wednesday,	7	,,	Moss Vale	2·30 p.m.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1914.

Society.	Secretary.	Date.
Corowa P., A., and H. Society	John D. Fraser	Aug. 18, 19
Forbes P., A., and H. Association	S. H. Bates	,, 18, 19
Coolamon A. and P. Association	E. Owen	,, 18, 19
Murrumbidgee P. and A. Association (Wagga Wagga)	A. F. D. White	,, 25, 26, 27
Parkes P., A., and H. Association	G. W. Seaton	,, 26, 27
Wellington P., A., and H. Society	A. E. Rotton	Sept. 1, 2
Grenfell P., A., and H. Association	G. Cousins	,, 1, 2
Ariah Park P., A., H., and I. Association	J. N. Taylor	,, 1, 2
Gunnedah P., A., and H. Association	M. C. Tweedie	,, 1, 2, 3
Manildra P. and A. Association	A. Anderson	,, 2
Germanton P., A., and H. Society	Jas. S. Stewart	,, 2, 3
Albury and Border P., A., and H. Society	W. I. Johnson	,, 8, 9, 10
Young P. and A. Association	T. A. Tester	,, 8, 9, 10
Cudal P. and A. Society	K. A. Gavin	,, 9
Moama A. and P. Association	A. E. Bartlett	,, 9
Ganmain A. and P. Association	J. F. Ashwood	,, 15, 16
Cootamundra A., P., H., and I. Association	T. Williams	,, 15, 16
Cowra P., A., and H. Association	E. W. Warren	,, 16, 17
Murrumburrah P., A., and I. Association	J. A. Foley	,, 22, 23
Temora P., A., H., and I. Association	J. Clark	,, 22, 23, 24
Riverina P. and A. Society (Jerilderie)	J. Kennedy	,, 23
Canowindra P., A., and H. Association	G. Newman	,, 23, 24
Henty P. and A. Society	H. L. Yates	,, 29, 30
Millthorpe A., H., and P. Association	C. J. E. Hawken	,, 29, 30
Yass P. and A. Association	W. Thomson	,, 30, Oct. 1
Urana P. and A. Society	J. Wise	,, 30, ,, 1
Hay P. and A. Association	G. S. Camden	Oct. 6, 7
Berrigan A. and H. Society	T. E. Crowther	,, 8
Hillston P. and A. Society	S. J. Gordon	,, 14
Tweed River Agricultural Society	A. E. Budd	Nov. 11, 12
Lismore A. and I. Society	T. M. Hewitt	,, 25, 26, 27

1915.

Society.	Secretary.	Date.
Albion Park A., H., and I. Association	M. A. Brown	Jan. 20, 21
Kiama A. Association	G. A. Somerville	,, 26, 27
Wollongong A., H., and I. Association	W. J. Cochrane	,, 28, 29, 30
Berry A. Association	S. G. Banfield	Feb. 4, 5
Wyong A. Association	C. R. Seabrook	,, 5, 6, 7
Shoalhaven A. and H. Association	H. Rauch	,, 10, 11
Newcastle A., H., and I. Association	E. J. Dann	,, 10, 11, 12, 13.
Dapto A. and H. Society	J. H. Lindsay	,, 23, 24
Guyra P., A., and H. Association	P. N. Stevenson	,, 23, 24, 25
Uralla A. Association	H. W. Vincent	Mar. 2, 3, 4
Tenterfield P., A., and M. Society	F. W. Hoskin	,, 2, 3, 4
Gloucester A., H., and P. Association	G. E. Furness	,, 3, 4
Camden A., H., and I. Society	A. Thompson	,, 3, 4, 5
Glen Innes & Central New England P. & A. Assoc'n	G. A. Priest	,, 9, 10, 11
Coramba District P., A., and H. Society	H. E. Hindmarsh	,, 10, 11
Tumbarumba and Upper Murray P. and A. Society	E. W. Figures	,, 10, 11, 12
Inverell P. and A. Association	J. McIlveen	,, 17, 18, 19
Goulburn A., P., and H. Society	G. G. Harris	,, 18, 19, 20
Quirindi P., A., and H. Association	H. H. Rourke	,, 23, 24

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Agricultural Gazette of New South Wales.

Farmers' Experiment Plots.

MAIZE EXPERIMENTS, 1913–14.

North Coast District.

G. MARKS, Inspector of Agriculture.

THE maize experiments for the past season were arranged for planting on the following farms:—

J. F. Lee, Woodview.
R. E. Burton Bradley, Irvington.
J. Wilson, Coramba.
D. W. Baker, Coramba.
H. B. Faviell, Bonville.
C. J. Rogers, Stuart's Point.
R. Frith, Gladstone, Macleay River.
J. Smith, Wauchope.
A. McM. Singleton, Mondrook..
W. Reichert, Gloucester.

Owing to the severe drought that prevailed on the coast last spring and early summer the plots at Woodview, Irvington, and Gloucester could not be planted, and the experiments at Wauchope resulted in total failure from the same cause. The experiments at Bonville, on account of the dry weather, were not planted till late in the season (January), and were consequently late in maturing. As a result of the continuous showery weather of the past few months, which prevented the crops from maturing and ripening properly, they could not be harvested till recently.

The past season has been the worst experienced on the coast since the inauguration of the Farmers' Experiment Plots. The rainfall on the plots represents between 12 and 14 inches of rain recorded during the period the crops occupied the ground, and it would thus appear that there was ample for crop requirements. Had this amount been distributed evenly throughout the growing period, such would have been the case, but upon analysis there was really only about 5 inches that could benefit the crop. The balance in the form of heavy rains came after the crop had finished its growth, and was on that account of no benefit. It must be noted further that all the lands where experiments were carried out on the rivers are badly infested with nut grass, which prevents methods being adopted whereby land might be fallowed for some time, and moisture thereby conserved. Any resting of cultivation areas in this manner favours the vigorous growth of this pest, which affects in a material way the moisture content at planting time and during growth, particularly during a dry

season. So far it would appear that the best method of dealing with these lands is to keep them continually cropped with something after the staple crop had been harvested. By this means the nut grass is prevented from spreading so freely, and there is consequently a better chance for the planted crop to get a good start.

Variety Trials.

The past season has favoured the earlier maturing varieties on the whole, and of these Early Leaming has again easily come out on top. It is, however, not as early as its name would suggest. It would be better to class it as a mid-season variety. The experiments which have been carried out for the past five years have given results whereby this variety can be singled out as the best of the earlier varieties for North Coast conditions. In certain quarters there are objections to growing the early types, the chief objection being that they ripen in the middle of summer, when the weather is hot and the maize weevil very bad. On the other hand, the slow-maturing types ripen later in the season when the weather is beginning to get cooler and the weevil pest is not so prevalent. These are characteristics which, of course, have to be considered, particularly if the farmer wishes to hold on to his crop for a few months. Of the main season or late varieties, Yellow Dent can be strongly recommended as the best for the North Coast. In some instances they were below the yields of some of the others, because this season the earlier varieties were favoured with better weather conditions.

MAIZE VARIETY TRIALS (GRAIN), 1913 14.—North Coast District.

Variety.	J. Wilson, Coramba.		R. Frith, Gladstone.		A. M. Singleton, Mondrook.		H. B. Faviell, Bonville.	
Rainfall in inches	13·72		13·84		13·14		—	
	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.
Yellow Dent	78	6	44	23	65	26	57	18
Riley's Favourite	79	40	49	49	60	15	20	50
Early Leaming	88	10	59	8	62	47	44	11
Taraganda White	77	38	......		60	42	41	44
Boone County Special	......		48	3	......		......	

Manurial Trials.

Manurial trials were recorded on three farms, and the appended table shows the yields. Though it is evident that the manure was not wholly available for plant use consequent upon the drought, still in most places the yields were increased. The most noticeable features were obtained at Coramba. On this particular farm there is no nut grass, so that methods could be practised whereby soil moisture could be conserved. Here superphosphate applied at the rate of 2 cwt. per acre gave an increase of 12½ bushels over the unmanured plot.

It would, perhaps, be of value to give a brief description of the methods adopted on this farm. Three years ago and up to the time when the Department commenced experiment work here, the general maize average did not

exceed 40 to 50 bushels per acre. Just before the first experiments were planted the old maize stalks were cut up, ploughed under by a disc plough, 11 or 12 inches deep, in the early autumn, and a crop of field peas planted. The peas were turned under the following spring for green manure. Yellow Dent, manured with superphosphate at the rate of 2 cwt. per acre, yielded 60 bushels per acre, and 7 bushels more than the unmanured plot. After the 1912-13 crop was harvested the stalks were again turned under and field peas planted for green manure. A fine crop resulted, which was turned under in early spring. As the land was in good order the weed growth was kept in check and moisture conserved by frequent harrowings till sowing time. Regular cultivations throughout the season of growth were also strictly observed. The effect of this was distinctly noticeable during the heat wave of December last, when all the maize in the district was badly wilted, while that on the plots did not show the least effect from the heat. The results speak for themselves. The unmanured plot gave an increase of 25 bushels over last year's yield, while the superphosphate gave an increase of 30½ bushels over the corresponding plot of the previous season.

It would appear from the yields obtained during this and past seasons that superphosphate is the most profitable fertiliser to use. Further tests regarding the use of superphosphate will be carried out during the coming season.

MAIZE FERTILISER TRIALS (GRAIN), 1913-14.—North Coast District.
Variety: Yellow Dent.

Manure.	Amount per Acre.	J. Wilson, Coramba.		R. Frith, Gladstone.		A. M. Singleton, Mondrook.		H. B. Faviell, Bonville.	
Rainfall in inches ...	——	13·72		13·84		13·14		——	
	cwt.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.
M1	1¼	74	32	50	14	67	4	57	33
Superphosphate... ...	2	90	39	49	34	67	34	61	4
Superphosphate... ...	1	81	42	46	1	64	25	69	21
No manure	......	78	6	44	23	65	26	57	18
P5	1¼	76	7	44	20	62	47	58	22
M5	1¼	68	47	48	42	59	41	48	42

M1 is composed of 6 parts dried blood, 4 parts bone-dust, 8 parts superphosphate, and 2 parts sulphate of potash.

P5 is composed of 16 parts superphosphate and 4 parts sulphate of potash.

M5 is composed of 13⅓ parts superphosphate and 6⅔ parts sulphate of ammonia.

Green Fodder Variety Trials.

Trials with varieties of maize for green fodder were carried out at Stuart's Point and Coramba. On the former the soil is of a free volcanic nature, very porous, and not able to stand the effects of drought to the same extent as the heavier types at Coramba. Early Leaming and Riley's Favourite were very stunted, and, consequently, their weights were not taken. Yellow

Dent here gave the best results of the maize. Planter's Friend, being a little later, was a little more fortunate with the late rains.

At Coramba there was not such a great deal of difference amongst the varieties. The Taraganda White came out on top, but on account of the drought the yields of all were affected. It is, however, plainly evident that, even under dry conditions, with good cultivation, it is possible to obtain heavy yields of succulent green feed. Unfortunately, owing to the usually good seasons and good state of pastures, dairymen do not grow green fodder crops as they should, and too much reliance is placed upon the pastures, the state of which determines the income from the dairy.

MAIZE VARIETY TRIALS (GREEN FODDER), 1913-14.—North Coast District.

Variety.	C. J. Rogers, Stuart's Point.				D. W. Baker, Coramba.			
Rainfall in inches	12·45				13·72			
	tons	cwt.	qrs.	lb.	tons	cwt.	qrs.	lb.
Yellow Dent	10	16	0	8	18	13	0	24
Taraganda White	8	16	3	4	19	16	3	4
Early Leaming	...	...	...	...	17	9	2	16
Riley's Favourite	...	...	...	...	14	10	2	24
Planter's Friend	12	15	1	12	21	0	1	12

Green Fodder Manurial Trial.

For this experiment Yellow Dent was selected. As with the grain trials the superphosphate plots again came out on top, with increases ranging from 4 to 6 tons over the unmanured. This is the more interesting, considering that nearly 75 per cent. of the rain recorded fell after the crops were commencing to ripen off. On this account the merits of the different mixtures cannot be faithfully compared.

MAIZE FERTILISER TRIALS (GREEN FODDER), 1913-14.—North Coast District.
Variety: Yellow Dent.

Manure.	Amount per acre.	C. J. Rogers, Stuart's Point.				D. W. Baker, Coramba.			
Rainfall in inches	——	12·45				13·72			
	cwt.	tons	cwt.	qrs.	lb.	tons	cwt.	qrs.	lb.
M1	1½	12	11	1	20	21	16	0	8
Superphosphate	2	16	13	3	20	22	17	2	20
Superphosphate	1	15	6	1	20	22	13	3	0
No manure	.....	10	16	0	8	18	13	0	24
P5	1¼	15	6	1	20	19	12	3	12
M5	1½	20	0	2	24	22	11	3	4

South Coast District.

R. N. MAKIN, Inspector of Agriculture.

THE summer of 1913–1914 was remarkable for the absence of rain; indeed, it ranks as one of the driest summers on record for the South Coast. The winter of 1913 was favoured with an abundance of rain, amounting to a deluge in some districts. The rain was continuous from March to about the middle of July, but from then up to March but little fell, except in the Bega district, where good rain was experienced in October and November. Unfortunately, very heavy rain during March of this year caused the Bega flats to be flooded, a great quantity of ripening maize being destroyed, amongst it being two experimental plots.

Objects of Plots.

Maize fodder plots were established during the season at different centres, the object being to test the effect of artificial manures on maize for green fodder, and the growing of cowpeas and maize together.

Sowing and Cultivation.

The well-known Improved Yellow Dent Maize was sown at the rate of 20 lb. seed per acre, being drilled in with the maize planter which, at the same time, drilled the manure. In sowing the cowpeas and maize, 5 lb. of Black Cowpeas were mixed with 20 lb. Imperial Yellow Dent and sown together, using the usual 10-hole plate in the machine. When the crops were well above ground they were harrowed; when they were too high for the harrow, the scuffler was run through when necessary.

The Best Results.

From the returns, which are here tabulated, it will be seen that the best results are from the plots on the Farm Home at Mittagong, and on those of Mr. J. Heffernan, Moruya. In both cases the land was ploughed deeply during the winter, and worked with the harrow during the months of August and September, which were dry. They were sown about the middle of October in a moist seed-bed, germinated well, and made rapid growth until January, 1914, when the continuous dry weather began to seriously affect the crops. From the time the crop was sown at Moruya to the time it was cut (six months) a little over 5½ inches of rain fell. At Mittagong the plot was not harvested until April; owing to climatic conditions, the growth was not so forward as on the coast. During March heavy rain fell, and the crop made excellent growth. There is no doubt that the early ploughing and subsequent working which these two plots received prior to sowing were big factors in the successful results. At the same time, inasmuch as there were no unfallowed portions sown for comparison, it cannot be stated how much the crops benefited by the treatment. This is a matter that should be ascertained in future experiments. In the case of other plots sown at Kangaroo Valley, Pambula, and Unanderra, the ground was ploughed a week or so prior to sowing,

the soil being in fair condition at the time. Germination was satisfactory, but when the dry weather set in the ground lost its moisture quickly. The crops made little growth, and when the rain came in March they were too far advanced to make any further growth.

Artificial Manures.

The full effect of artificial manures could not be expected in such a season. With the exception of the plots at Mittagong and Moruya, it would not be fair to make comparisons. In these two plots, P5, a mixture consisting of 16 parts superphosphate and 4 parts sulphate of potash, applied at the rate of $1\frac{1}{4}$ cwt. per acre, and costing about 7s. 6d. per cwt., gave the best returns. The mixture marked M5, consisting of superphosphate $13\frac{1}{3}$ parts and sulphate of ammonia $6\frac{2}{3}$ parts, applied at the rate of $1\frac{1}{2}$ cwt. per acre, and costing about 9s. 9d. per cwt., appeared to benefit the crops most in their early growth. All the crops were seeded in a fairly moist seed-bed, and under these conditions the sulphate of ammonia would soon become available, and assist the plants in the early stages. This may account for the fact that in the plots at Pambula, Unanderra, and Kangaroo Valley it gave the highest returns of any of the mixtures. The complete manure M1, consisting of 6 parts dried blood, 4 of bone-dust, 8 of superphosphate, and 2 of sulphate of potash, applied at the rate of $1\frac{1}{2}$ cwt. per acre, and costing about 9s. 9d. per cwt., did not give such good results as the others, but returned a satisfactory increase over the unmanured portions. In the trial with superphosphate alone, there is little difference in the yield resulting from the application of 1 cwt. and 2 cwt. per acre; if anything, the difference is in favour of the smaller quantity. At Mittagong, where the soil was poor, superphosphate gave excellent returns, and the few pounds of potash in the P5 mixture increased the yield satisfactorily. Where it was possible, two sections were left unmanured for comparison, and this method proved very satisfactory. Should there be such variation in the soil, at least two such check plots are imperative.

In the case of the plot at Kangaroo Valley, portion of the paddock had been under lucerne, which had been eaten out by rabbits, and was ploughed up; the other portion had been under potatoes for several years. The whole paddock was sown under maize, all the mixtures, together with an unmanured plot, being sown on the potato ground, and the balance on the lucerne ground. A glance at the returns in the table shows an interesting result, viz., that the returns from the unmanured portions of each case were very much lower than the manured. The increased return on the ground that had been sown with lucerne was probably due to the rest it had, more than to any effect that the lucerne might have had, as rabbits ruined the plants at an early stage.

Cowpeas and Maize.

From the table of results, it will be seen that the plots on which cowpeas and maize were sown gave splendid returns. Superphosphate at the rate of 1 cwt. per acre was drilled in with them. Cowpeas are excellent drought

resisters, and in every case they made splendid growth, climbing to the tops of the maize stalks, and forming a dense growth at the base. At Pambula they rotted out owing to flood waters covering the crop twice. The growing of cowpeas with maize for fodder is strongly advised, not only on account of their growing well together, but also because they greatly enhance the feeding value of the fodder. It is found that there is a little extra trouble in harvesting the mixed fodder, but the increased yield and the greater fodder value more than compensates for it.

MAIZE MANURIAL TRIALS (GREEN FODDER), 1913-14.—South Coast District.

Manure.	Amount per acre.	J. H. Martin, Pambula.				L. Carr, Unanderra.				J. Chittick, Kangaroo Valley.				J. Heffernan, Moruya.				Farm Home, Mittagong.			
	cwt.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.
P5	1¼	11	8	2	8	7	8	2	8	3	2	3	12	18	5	1	20	21	2	3	12
M5	1½	11	17	0	16	12	8	2	8	7	13	2	8	16	0	0	0	19	2	3	12
M1	1½	5	19	2	16	7	10	2	24	7	10	2	24	15	0	0	0	17	17	0	16
No manure ...	..	8	11	1	20	6	5	2	24	2	2	3	12	11	8	2	8	8	2	3	24
Superphosphate .	2	10	2	3	16	6	13	0	20	8	15	2	0	13	14	1	4	19	6	2	22
Superphosphate ..	1	10	8	2	8	7	2	3	12	12	17	0	16	13	11	3	20	20	5	2	24
No manure ..	...	9	11	1	20	6	0	0	0	5	17	0	16	......				15	0	0	0
Maize and Cowpeas, with Superphosphate	1	7	2	3	12	9	0	0	0	14	11	1	20	18	11	1	20	22	0	2	24

THE EFFECT OF BINDER TWINE IN CHAFF.

THE Manager of the Glen Innes Experiment Farm has drawn attention to the practice of allowing the twine used in binding sheaves to be cut with the hay into chaff. To remove the twine one extra hand is required, and assuming his wages are 8s. per day, the cost would work out at only about 5d. per ton. Most authorities are agreed that the twine in the feed is harmful, and farmers recognise that it is better kept out, but assert that they get no more for chaff clear of it. They will, therefore, take no steps to eliminate the trouble till the purchaser is educated to do the right thing.

The matter was referred to the Stock Branch, where the opinion was expressed that while the amount of binder twine which each horse would get would be small, and if the chaff was cut short the amount eaten would pass through without causing much trouble, it could not be doubted that any horse getting more than the average amount of binder twine (especially if the chaff was cut long) would run the risk of getting a compact ball of twine forming in the stomach or intestines which would often lead to colic and impaction. There is no doubt that chaff should not contain binder twine, but whether the economic loss in horses and work of horses as a result of the ingestion of binder twine in chaff is great enough to balance the additional expense involved in keeping it out is another matter. From the point of view of the horse's health it should not be there at all, no matter what the economic result may be.

Farmers' Experiment Plots.

Potato Experiments, 1913–14.

COASTAL DIVISION.

A. J. PINN, Inspector of Agriculture.

Experiments were carried out on the coastal districts of the State at sixteen centres, viz., six in the North, five on the Central Coast, and five in the South Of these, two in the North and one in the Central were failures.

The experiments contained a variety and a manurial trial on each plot, comprising seven varieties of potatoes and three manure mixtures against an unmanured. In the trial of varieties, P4 manure was used, at the rate of 4 cwt. per acre throughout.

The growing of potatoes on an extensive scale on the coastal area of the State is only recommended for the spring crop, as the produce is then available at a time when potatoes are scarce and prices accordingly high. A yield of 3 tons would consequently represent a far greater financial return than would the same yield on the tableland centres later in the year. The growing of the autumn crop on the coast in any quantity is not recommended, owing to the liability to attacks of fungus diseases, and to the fact that the crop matures at a time when potatoes are abundant and prices correspondingly low. The coastal-grown tubers are not good keepers, and would therefore be sold during the glut in the market.

The planting season on the coast commences at the end of June in the far North and extends on to August and September on the South Coast. The largest potato-growing centre for early potatoes is on the Clarence River, where the bulk of the crop is planted in July and August.

Seeing that it is necessary to harvest the potatoes early in the season if good prices are to be obtained, quick-maturing varieties should be planted.

The following summary may be of value, as indicating the relative yields of the different varieties throughout the coastal districts. As all the varieties have not been grown on every plot, the figures cannot be taken as absolutely comparable.

Variety.	Number of Trials.	Average Yield per acre.			
		tons	cwt.	qrs.	lb.
Manhattan	13	4	9	3	25
Satisfaction	13	4	2	1	19
Coronation	13	3	16	2	15
Brownell's Beauty	13	3	13	1	15
Queen of the Valley	13	3	9	0	17
Carman No. 1	12	2	18	2	18
Surprise	12	2	6	3	8

Manhattan and Satisfaction have been largely planted on the North Coast this season—in fact, no other varieties will nearly approach the area planted. As the Department has taken a leading part in the advocacy of these two sorts as being suitable for North Coast conditions, this is a good indication of the interest taken by the farmers in the results of the experiment plots.

The following are the average yields in the manurial experiments:—

Manures.	Number of Trials.	Average Yield per acre.
		tons cwt. qrs. lb.
P4 Mixture	13	4 2 1 19
P5 Mixture	11	3 16 1 10
P6 Mixture	12	3 15 2 10
No manure	12	3 9 2 16

The manure mixtures used were as follow:—

P4: 4 cwt. sulphate of ammonia,
13 cwt. superphosphate,
3 cwt. sulphate of potash.

P5: 16 cwt. superphosphate,
4 cwt. sulphate of potash.

P6: 12 cwt. bone-dust,
4 cwt. superphosphate,
4 cwt. sulphate of potash,

each mixture being applied at the rate of 4 cwt. per acre.

North Coast District.

G. MARKS, Inspector of Agriculture.

Experiments were planted on the following farms:—

J. Shipway, Nimbin,
R. E. Burton Bradley, Irvington,
J. Wilson, Coramba,
F. Allard, Brooklana, Eastern Dorrigo,
J. W. Smith, Wauchope,
A. McM. Singleton, Mondrook.

The weather conditions were very unfavourable, the spring of 1913 being one of the driest experienced for many years. From this cause the plots at Nimbin were an absolute failure, whilst those at Irvington returned little more than the seed planted. At Eastern Dorrigo dry conditions retarded growth; and later on, after the tubers had set, continuous heavy rains fell which did not benefit the crop.

Variety Trials.

It was plainly evident that the plots did not get the full benefit of the fertiliser, as at harvest time free fertiliser was discernible throughout the

entire length of the drills, showing that it had not become disseminated through the soil. All the varieties did well, with the exception of Carman and Surprise. Though it would be unfair to condemn a variety by the results obtained under such unfavourable conditions, it would appear, however, that these two varieties are unsuited to the North Coast. At Coramba, Carman gave good yields, but at Wauchope and Mondrook the returns were very disappointing. Judging by the yields obtained, Manhattan, Satisfaction and Coronation are the best varieties. At Wauchope exceptionally fine specimens of Satisfaction were obtained. The rainfall at all the plots during the growing period was in the neighbourhood of 7 inches. It must be remembered that this included many showers approximating 20 points, which merely damped the surface and was speedily dried up by westerly winds.

The best results were obtained at Coramba. Prior to the planting of these plots, a fine crop of field peas that had been sown the previous autumn were ploughed under for green manure, using a disc plough. The land was ploughed 11 or 12 inches deep, and was afterwards kept clean and the surface kept loose by regular harrowings till planting time. At Wauchope and Mondrook the land suffered from the effects of the floodings during May and June, which necessitated a great deal of additional work to get it into good mechanical condition. At Brooklana the plots were planted in virgin land. This land requires working for a couple of seasons, in order to get the sweetening effects of weathering and better mechanical condition. In its virgin state these scrub lands are very acid, but they gradually improve with age and working. Further trials of the different varieties are, therefore, necessary in order to confirm opinions already formed of their individual merits. The following table gives the yields:—

POTATO VARIETY TRIALS, 1913-14.—North Coast District.

Variety.	J. Wilson, Coramba.	F. Allard, Brooklana.	J. W. Smith, Wauchope.	A. M. Singleton, Mondrook.	Average.
Rainfall in inches..	6·41	——	7·38	7·10	
	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.
Satisfaction ...	5 14 3 18	3 0 3 16	5 5 2 4	4 10 2 4	4 12 1 24
Carman No. 1 .	5 10 0 20	....	2 10 0 0	1 14 2 16	3 4 3 21
Manhattan... ...	5 13 1 16	4 2 2 0	5 1 1 20	4 10 2 4	4 16 3 24
Brownell's Beauty..	4 16 2 22	4 3 1 20	4 2 2 0	3 13 0 4	4 3 3 18
Surprise	3 12 3 22	2 13 0 4	2 13 0 8	2 11 2 12	2 17 2 18
Queen of the Valley	4 17 2 20	5 6 0 8	3 10 2 24	3 7 3 12	4 5 2 9
Coronation... ...	6 4 0 12	5 0 0 20	3 3 1 16	4 0 1 20	4 12 0 3

Each plot received a dressing of P4 manure at the rate of 4 cwt. per acre.

Advantage of Well-sprouted Seed.

A striking illustration of the benefits of planting good, well-sprouted seed was obtained on Mr. Wilson's farm, at Coramba. Adjoining the plot of

Satisfaction belonging to the manurial trial, two rows of Satisfaction were planted from seed procured on a neighbour's farm. These potatoes were well developed and sound, but they represented the produce of the previous winter crop and were consequently "new." In this condition the eyes had not begun to "shoot." They were planted under similar conditions to the main plots, and a manure mixture made up the same as P5 used. Though planted the same day, the unsprouted seed took very much longer to come up. Probably the dry conditions accounted for many not coming up at all, whilst of those plants that grew there was an absence of that sturdy, vigorous growth that characterised the plots adjoining.

The returns are interesting.

	Tons	cwt.	qrs.	lb.	
New seed Satisfaction yielded at rate of ...	2	1	3	4	per acre.
Well-sprouted Satisfaction „ ...	5	3	0	24	„

This section, which attracted much attention locally, affords sufficient proof of the necessity of farmers selecting good and well "shot" seed for planting.

Fertiliser Trials.

All were applied at the rate of 4 cwt. per acre, the cost of which represents:—

	£	s.	d.	
P4	1	19	0	per acre
P5	1	10	0	„
P6	1	15	0	„

As already pointed out, the weather conditions were too dry to allow the plants to get the full benefit of the fertiliser. At Coramba, however, P4 mixture gave the best results, giving an increase over the unmanured plot of 1 ton 5 cwt. per acre. P5 gave an increase of 13 cwt., and P6 1 cwt. At Wauchope P4 gave an increase of 1 ton 1 cwt. per acre.

At Mondrook and Brooklana the unmanured plots gave better yields than the manured. From this it would appear that artificial manure in a soil whose dry conditions do not permit of it being dissolved and incorporated with the soil, has probably a detrimental effect upon the yield.

Potato Fertiliser Trials, 1913-14.—North Coast District.
Variety, Satisfaction.

Manure.	J. Wilson, Coramba.	F. Allard, Brooklana.	J. W. Smith, Wauchope.	A. M. Singleton, Mondrook.	Average.
Rainfall in inches...	6·41	——	7·38	7·10	——
	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.
P5	5 3 0 24	3 10 2 24	....	3 7 1 8	4 0 1 19
No manure ...	4 9 2 26	3 14 2 16	4 6 3 24	5 7 3 4	4 9 3 3
P4	5 14 3 18	3 0 3 16	5 5 2 4	4 10 2 4	4 12 3 24
P6	4 10 3 15	3 10 2 24	....	3 16 2 12	2 19 2 6

Central Coast District.

J. W. SHAW, Assistant Inspector of Agriculture.

EXPERIMENTS were carried out in five different centres throughout the Central Coast District, the names and addresses of the experimenters being as follow:—

J. L. Ellis, Yarramalong, *viâ* Wyong.
J. Saunders, Nelson's Plains, Hunter River.
A. F. Wedlock, Abbotsford, Picton.
F. W. A. Downes, Brownlow Hill, Camden.
H. A. Coggins, Lansdowne, Canley Vale.

Early Preparation of Land.

At each centre arrangements were made for the land to be ploughed and to lie fallow for a short time prior to planting. During this period the harrows and cultivators were used when necessary, to destroy weeds and preserve a nice loose mulch on the surface in order to conserve all the moisture possible. It is generally believed that a short fallow is not so necessary for potatoes as for certain other crops, such as maize, but this idea has no foundation. In order to secure good potato yields it is absolutely essential that the land should be ploughed early, say in May or June. On the coast it is not always possible to plough at this time owing to the amount of rain which usually falls during the autumn months, but every attempt should be made to have the first ploughing done as soon as the condition of the ground will permit. When the soil is turned over and exposed to the atmosphere early, it receives the full benefit of any rain that falls, the frosts (which have a wonderful mellowing effect on newly ploughed land) act upon it, the sun and air have a natural sweetening tendency, and the soil on being reworked breaks down into a nice mellow, friable state.

Variety Trials.

At each centre the experiments were devoted to a trial of varieties and a manurial test. The varieties used were as follows:—Queen of the Valley, Coronation, Surprise, Brownell's Beauty, Carman No. 1, Manhattan, and Satisfaction. The last-named variety was chosen for the manurial experiments, the results of previous experiments on the coast having proved it to be one of the most suitable varieties for the coastal districts. At each centre all the varieties with one exception (Carman No. 1) germinated evenly without rain, proving that considerable moisture had been conserved by the early preparation of the land and the cultural methods employed previous to planting. The manure was sown by hand along the furrows just previous to planting the sets.

Manurial Tests.

In the manurial experiment four plots were sown with the same variety, the manures used being as follow:—

Plot 1.	Satisfaction,	P4 manure, 4 cwt. per acre.
„ 2.	„	P5 „ 4 „ „
„ 3.	„	No manure.
„ 4.	„	P6 manure, 4 cwt. per acre.

During the growing period a slight difference in the growth of the tops was noticeable on the plots where P4 and P5 manures had been applied, as compared with the growth on the unmanured plot. This difference was more apparent on the plots manured with P5. No doubt the large proportion of superphosphate contained in these two different manures was responsible for the difference in the top growth, as superphosphate with most crops has the effect of promoting early and vigorous development of the plants. The plot manured with P6 could very easily be detected from the unmanured during the growing period, but the difference in the top growth was not so apparent as on the plots where P4 and P5 mixtures had been applied.

At the time of digging, some of the artificial manure was noticeable along the furrows where it had been applied, so that it is possible that the crops did not obtain the full benefits from the fertilisers. This was perhaps due to the exceptionally dry season which was experienced at each centre where the experiments were conducted. It is well known that manure without moisture is of little value, consequently the slight differences between the manured and unmanured plots at Canley Vale and Camden may be accounted for by the unusually dry and hot weather conditions which prevailed during the growing period.

Comments on Varieties.

It is generally recognised that the early maturing varieties are best suited to the coastal districts, and the results of this year's experiments have once again confirmed this belief. Satisfaction and Manhattan were the first varieties ready for digging, and taking the quality of the tubers into consideration, they gave the most satisfactory returns. It appears characteristic of the Manhattan variety to produce large tubers of a good marketable size but few in number. Surprise, Queen of the Valley, and Coronation appear rather too late for the coastal districts, and are not being included in the coming season's experiments for that reason. Coronation, a variety in some respects similar to Manhattan, but much later, showed signs of second growth at each one of the plots when digging. Taking into consideration the fact that Carman No. 1 germinated rather unevenly in all the plots, this variety compares favourably with the other varieties as regards yield.

The Unfavourable Season.

As previously mentioned, the season was one of the driest known for many years, and had it not been for the fact that the land was prepared early, thereby conserving considerable moisture previous to planting, it is doubtful if any one of the plots would have been worth harvesting. At Nelson's Plains the months of September, October and November proved too dry to allow farmers to plant their spring crops of maize, sorghum, &c. The crops of potatoes at this centre were so poor that very few farmers considered them worth harvesting. Although at this centre all precautions were taken, before and after planting the plots, to guard against unfavourable weather, the conditions which prevailed during the growing period were so severe that not one of the varieties produced tubers sufficiently large to warrant the

trouble of harvesting. The season at Camden, Picton, and Canley Vale also proved very dry, and the yields, as will be seen from the accompanying table, were light.

The Influence of Fertilisers.

From a glance at the tables it will be seen that at Yarramalong in particular the manured plots in all cases yielded considerably higher than the unmanured. The difference in the yield of the plot manured with P4 mixture was 1 ton 1 cwt. 2 qrs. 14 lb. over the unmanured. The difference was still greater on the plot manured with P6 mixture, being 1 ton 12 cwt. 0 qr. 14 lb. more than the unmanured. More rain was recorded at Yarramalong during the growing period than at any of the other centres, and as a result the differences in favour of the manures were greater. At each of the other centres there was a slight difference in the yields of the plots manured with P4 and P5 mixtures over the unmanured, but had the season not proved so dry, it is reasonable to assume that much greater differences would have resulted.

Remarks.

Although there are no large potato-growers in the Central Coast districts, most farmers grow a small area of potatoes for home consumption, and perhaps a few for market. Taking into consideration the fact that the past few seasons have proved very dry, it is wise to take all precautionary measures to conserve all the moisture possible before planting. This can be done by early ploughing and keeping the land free from weeds.

It is wise to select early maturing varieties such as Satisfaction and Manhattan, as these varieties will invariably give better returns than later-maturing sorts. Early planting, that is, as soon as the danger of severe frosts are over, is another important factor to bear in mind. Frequent cultivation after planting, first with the harrow and afterwards with the cultivator, are factors which should not be overlooked, and which aid in the yields being considerably increased.

POTATO VARIETY TRIALS, 1913–14.—Central Coast District.

Variety.	J. L. Ellis, Yarramalong, *via* Wyong.				F. W. Downes, Camden.				A. Wedlock, Picton.				H. A. Coggins, Canley Vale.				Average.			
	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.
Surprise	2	11	0	14	1	7	2	0	1	5	3	14	3	7	2	0	2	3	0	0
Coronation.. ...	3	19	3	14	2	11	1	20	1	19	3	10	3	4	1	4	2	18	3	12
Manhattan.. ..	4	18	0	14	3	15	0	0	3	12	2	8	3	16	1	20	4	0	2	3
Queen of the Valley	4	6	3	14	3	15	3	16	2	14	3	8	3	12	2	0	3	12	2	3
Carman No. 1 ...	4	3	2	14	3	3	1	16	2	13	2	16	2	7	3	12	3	2	0	14
Brownell's Beauty	3	19	1	14	3	3	0	4	2	7	2	12	2	10	0	0	3	0	0	0
Satisfaction ...	4	11	1	0	4	1	3	24	3	9	2	14	2	16	1	20	3	14	3	8

POTATO MANURIAL TRIALS, 1913–14.—Central Coast District.

Variety, Satisfaction.

Manure.	J. L. Ellis, Yarramalong, *via* Wyong.				F. W. Downes, Camden.				A. Wedlock, Picton.				H. A. Coggins, Canley Vale.				Average.			
	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.
P4	4	11	1	0	4	1	3	24	3	9	2	14	2	16	1	20	3	14	3	7
No	3	9	2	14	3	15	2	4	3	4	2	14	2	16	1	20	3	6	2	6
P5	3	13	1	14	4	1	1	0	3	10	0	0	2	13	3	20	3	9	2	15
P6	5	1	3	0	3	13	0	24	3	6	1	14	2	17	0	16	3	14	2	14

South Coast District.

R. N. MAKIN, Inspector of Agriculture.

On the whole the potatato experiments on the South Coast last season were satisfactory, there being an abundance of rain during the winter which saturated the subsoil. By ploughing the ground as soon as the weather would permit, in July, the moisture was to a certain extent conserved.

Planting.

The first plot was sown the latter end of August, at Kangaroo Valley, the ground being in first class order. The system of planting observed was to plough a drill and then come back on the same drill with the plough. This secures deep planting, which is strongly recommended for the early planting on the coast as it assures the set being placed where the moisture is likely to exist, and also does away, to an extent, with hilling. The drills were run out 2 feet 6 inches apart, and the sets sown about 15 to 18 inches in the drills and P4 manure broadcasted in the furrow, at the rate of 4 cwt. per acre. After planting and manuring, the drills were harrowed in the same way the drills ran; by this means a depression was left which retained any rain that fell, thereby diverting the moisture to the growing set.

Cultivation.

The cultivation of the crop, after germination, was carried out by harrowing the crop until the tops were too high, the harrow travelling across the drills, filling them up and levelling the surface. The crops were scuffled, and later on, when the tubers were swelling were hilled slightly. Fortunately there was no appearance of any serious fungoid or insect trouble, so spraying was unnecessary.

Germination.

In nearly all the varieties germination was good, the exceptions being Carman No. 1 and Surprise. This was due, in the case of Carman, to the seed being knocked about in transit, and in Surprise to the seed being so large that it necessitated much cutting.

As these two varieties are, apparently, not suitable for coastal conditions more attention will be paid to earlier maturing varieties.

Rainfall.

The earlier part of the season was favourable for the crops, but at a critical time, when the crops were flowering, the weather set in dry. The rainfall for the month of September, in most districts, varied from 1¾ inches to 2¾ inches; this helped immensely, but each succeeding month the fall diminished, and at harvesting time, in January and February, there was no rain recorded at all in some districts. When the rain set in, in March, such a quantity fel that, in the case of Pambula and Mittagong, where the crops were not so forward, a number of potatoes were lost through wet rot.

Results.

From the table of returns it will be seen that, of the varieties, **Manhattan** gave the best yield and **Satisfaction** next. These are really the only varieties in this experiment worth consideration for South Coast conditions. They may be classed as mid-season varieties, are not so liable to second growth as other and later varieties, and are fairly good keepers.

Coronation gave some good returns, but while it is a very fine potato for the highlands it is not to be recommended for coastal conditions on account of its disposition to second growth. Queen of the Valley is not at all a sure cropper. It also grows too rough, has deep eyes, and is inclined to second growth. Owing to the difficulty of securing true Brownell's Beauty seed, this old variety might now give place to some of the newer sorts. Carman No. 1 is a white skin variety, but an excellent cooker. Surprise is a potato which does not yield many tubers, but those that form are usually of first rate size and quality. This variety is too late for the coastal districts.

The Manurial Trials.

In the manurial trial Satisfaction was used, as that variety has shown its adaptability to coastal conditions. The result of this manurial trial, on the average—leaving the Pambula plot out, as the unmanured and P5 sections were lost through flood waters—show little difference from the effect of the different manures, but the difference between the manured and unmanured sections is of interest, as an increase of over a ton per acre was secured from each mixture, a result which justifies the expenditure. Besides obtaining an increased yield it was noted that there was a greater percentage of marketable tubers on the manured sections than on the unmanured.

POTATO VARIETY TRIALS, 1913-14.—South Coast District.

Variety.	Farm Home, Mittagong.	J. Raffery, Albion Park.	J. H Martin, Pambula.	J. R. Milne, Moruya.	J. Chittick, Kangaroo Valley.	Average.
	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.
Coronation ..	0 15 0 20	1 15 2 24	4 18 1 6	6 0 1 24	6 2 0 16	3 18 1 12
Carman No. 1 ...	0 10 2 14	1 11 1 20	4 14 0 12	4 2 1 12	2 2 0 0	2 12 0 11
Brownell's Beauty	2 8 2 8	3 13 0 24	3 10 2 24	5 5 0 0	4 0 3 16	3 15 2 20
Surprise	1 10 0 0	1 8 0 14	....	2 0 1 20	3 0 2 16	2 4 3 5
Manhattan ..	1 7 2 0	4 11 0 12	5 18 0 22	5 0 1 12	6 2 2 8	4 11 3 22
Satisfaction ...	1 8 0 12	3 15 0 0	3 11 2 2	5 1 1 20	6 4 1 4	4 0 0 7
Queen of Valley ..	0 17 2 0	2 8 0 24	4 6 1 0	3 6 3 24	2 8 0 14	2 13 1 18

POTATO MANURIAL TRIALS, 1913-14.—South Coast District.

Manure.	Farm Home, Mittagong.	J. Raffery, Albion Park.	J. H. Martin, Pambula.	J. R. Milne, Moruya.	J. Chittick, Kangaroo Valley.	Average.
	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.	t. c. q. lb.
P5	1 5 0 0	4 2 0 16	....	4 2 0 16	6 10 2 24	4 0 0 0
P6	1 0 1 4	3 18 0 14	2 19 1 4	4 0 0 0	6 3 3 0	3 14 0 10
Unmanured ...	0 11 1 16	2 9 0 6	....	3 15 0 0	3 15 0 0	2 12 2 12
P4	1 8 0 12	3 15 0 0	3 11 2 2	5 1 1 20	6 4 1 4	4 0 0 7

Suggestions in regard to the Checking of Sheep Maggot Flies.

W. W. FROGGATT, F.L.S., Government Entomologist, and J. L. FROGGATT, B.Sc., Officer-in-Charge of Government Sheep Fly Experiment Station.

The following general summary has been authorised for publication by the Sheep Blowfly Investigation Sub-Committee of the Department. The attention of readers is drawn to the fact that the recommendations are based on the conclusions of one year's experiments only, and may be somewhat modified as a result of subsequent investigation.

SINCE the formation of the Government Sheep Fly Experiment Station in the Brewarrina district last September, a considerable amount of information has been obtained through the field and laboratory investigations which have been carried out under natural surroundings.

As soon as the camp was fixed the Department was enabled, through the kindness of Messrs. W. and Y. C. Dickson, to obtain a sketch map of Yarrawin Station, showing all paddock fences, gates, roads, tracks, and the waterholes, tanks, dams, and river frontages. We were thus able to make a biological survey of the natural conditions of the country, and visit most of the watered areas at regular intervals.

As the summer advanced it was found that most of the flies were congregated in sheltered areas and chiefly near the water, while any dead stock and other carrion, in which the flies breed, were invariably found in the vicinity of the watering places and sheep camps.

Attention was, therefore, turned to the carrion, in which the sheep maggot flies breed; and we are convinced from a careful study of all decaying animal and vegetable matter, that it is only in decaying animal matter that the flies which infest the live wool of sheep are developed in the first instance. Therefore, the methods to be adopted must be preventive measures, and must include the destruction of all matter in which maggots develop, by cutting up, burning, or poisoning all dead animal matter on the land. If this be done thoroughly the flies will, in a very short time, be very greatly reduced in numbers, and their natural enemies also will be enabled to assist in their control.

Where a recently-dead animal is found, and the flies are very plentiful, enormous numbers of flies can be attracted and killed by half skinning the carcase and slashing the flesh, and then treating it with a solution of 1 lb. of arsenic dissolved by boiling in 5 gallons of water. Sucking up the poison, thousands of flies die round every carcase thus treated, and in the summer every fly in the neighbourhood will come to a freshly flayed carcase. The action of the arsenic upon the flesh, however, soon stops the decomposition and hardens it, so that it loses its attractive power within the second day;

but the carcase can be turned over and the under surface will act for a poison bait for another day when so treated. The remains will not be blown after such treatment, if the carcase has been thoroughly soaked with the poisoned water, nor will birds or animals be attracted to it, but it is best to burn it if wood be available

Burning all Carcases.

Where a carcase or offal of any kind is found infested with maggots, it should be burnt; and the proper method is to turn the dead animal over, make a fire where it has been resting, turn it back on to the firewood heap, and see that everything is consumed. The usual method for a station-hand to burn a carcase, when sent out by the manager, is to pile some brushwood against its back, and set fire to it. In the case of a sheep this may burn it sufficiently, but where it is a dead horse or bullock, it generally simply scorches the hide and burns the ends of the legs and tail off, leaving the mass of putrid flesh and decomposing paunch more protected than ever, for the crows like their meat fresh, and leave it when otherwise. We have seen numerous examples of beasts thus partially burnt, which, on examination, turned out to be the sheltering place of millions of maggots protected beneath the burnt skin and paunch from every kind of bird.

Where such a beast cannot be burnt, it can, if found in any decent condition, be skinned and cut up, the paunch turned out, and the sun and birds will soon account for the rest. In the case of a sheep it can be opened out, and hung on a fence, if not poisoned. The maggots which drop from it will find many enemies when thus exposed, if the heat of the sun on the hard ground does not kill them at once.

The bulk of the maggots being protected from their enemies and the weather by the shelter of the dead body, the very fact of turning it over means a great help in killing the flies in the maggot state.

It will probably be claimed that on large properties the destruction of dead carcases and offal, as here suggested, is not practicable. It might not have been so a few years ago, when the whole country was covered with poisoned rabbits, but this condition of things (one of the contributing causes to the enormous increase of the blow-fly pest), does not now exist over a very large area of the western country. The few poisoned rabbits that are not torn to pieces by the crows are a very small factor in the generation of blow-flies on well-managed stations such as Yarrawin.

If the musterers and boundary-riders were instructed to treat or destroy in an effective manner all dead animals they find there would not be many missed on their rounds.

The root of the evil is the breeding-ground of the flies. Get at this, and the decrease in the number of flies will mean a substantial reduction in the sheep blown.

Treatment after Sheep are blown.

When once the sheep are blown, the maggots under the protection of the fleece can only be destroyed by shearing off the infested wool, and

with some mixture to kill or drive out the maggots exposed. This means a great deal of labour and expense, without taking into consideration the injury done to the sheep and loss of wool. A large series of experiments have been carried out with a number of the most popular preparations on the market for killing sheep maggots in the wool, and our experience is that, in spite of the claims put forward by the vendors, not one of them is more than a palliative. In addition, those that are most effective damage or spoil the wool that comes in contact with them.

The wool on a sheep's back grows at the average rate of a quarter of an inch in length every month, so that there is always unpoisoned wool open to infection on a sheep that has once been blown, and unless all smelly wool is removed or deodorised the sheep is very likely to become reinfested.

The Use of Traps or Baits.

The experiments, apart from field work, have included a careful study of the life history and habits of the different species of flies that have been bred from blown wool; also, endeavours have been made to obtain some mixture or essential oil that will attract the flies away from the sheep to traps or poisoned baits, or induce them to deposit their eggs on material treated with solutions with such attractive properties, where the maggots when hatched out will die.

Though up to the present most of the experiments have been negative in their results, yet, with the knowledge thus gained, we think we are on the right track for a solution of the difficulty.

The question of the inoculation of the blood of the sheep to render them immune to the attacks of the blow-flies has been raised in certain quarters, and the statement made that all sheep that become blown are sickly or in an unhealthy condition. This is not borne out by field observations. Perfectly healthy sheep, if their wool is either soiled or wet with either urine or after-birth, are liable to be blown. If a sheep is badly blown its blood is naturally fevered as compared with the blood of a clean sheep. In the first stages of the primary infestation, the pest is entirely confined to the wool, not even the skin being affected. But in the later stages of the development of the maggots, and often in cases of reinfestation, the maggots are found to break through the skin, setting up intense irritation and inflammation, when the sheep gets into a fevered condition.

If the wool be deodorised when treated, the smell that attracts the flies would be gone, and when the maggots are killed the danger of reinfestation would be greatly lessened.

Sheep Maggot Flies.

WALTER W. FROGGATT, F.L.S., Government Entomologist.

THE following is a brief description of the most common sheep maggot flies:—

Lucilia sericata.—**The English Sheep Fly.** (No. 1 on Plate.)

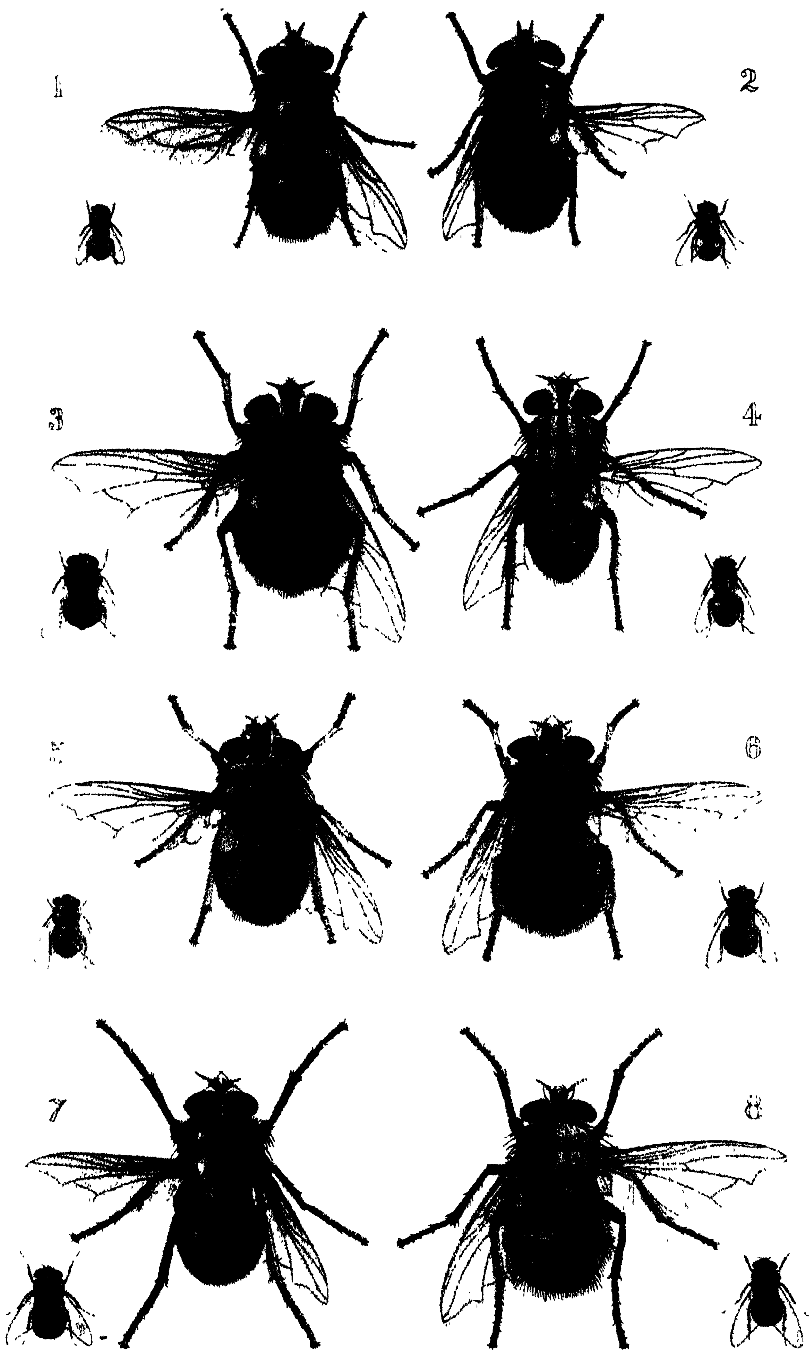
This species, and the allied *Lucilia cæsar*, have been long known in the coastal districts, and are almost cosmopolitan, but it was only during the last year that they have been found among the sheep in the western country. The second species, *Lucilia cæsar*, chiefly differs from the one figured in having a more coppery metallic tint. The fly is the common metallic bright green fly of the streets, back yards, and gardens about Sydney, and though it will blow meat placed outside, seldom enters the house in search of food in the same way as the common yellow blow-flies do. It feeds upon all kinds of decaying animal and vegetable matter, damaged fruit, offal, kitchen refuse, and congregates on plants and shrubs where aphids or scale insects are throwing out honey dew. The maggots are smooth, tapering, cylindrical creatures of the typical form of fly larvæ, and pupate in oval brown pupa cases in a similar manner This is the common sheep maggot fly of Great Britain, where it is a well known pest in sheep's wool. It is sometimes bred from maggoty wool in Australia, but up to the present is not common in live wool. Allied in general form and colour to *Calliphora rufifacies*, it differs in being of a more distinct green tint, with a whitish shade on the front of the thorax, and the upper surface clothed with more stout bristle-like hairs, and no soft downy ones.

Calliphora rufifacies.—**The Green and Blue Sheep Maggot Fly.** (No. 2 on Plate.)

This is the metallic green and blue blow fly that is so common all over the interior and inland country of Australia. It is found flying about all kinds of dead animals and carrion, and under natural conditions deposits its eggs on dead animals, and damp-smelling wool on live sheep. The maggots hatching from these eggs are known as "Hairy Maggots," because each of the segments of the body is furnished with a row of fleshy filaments, which give them a hairy appearance. They are shorter and more thick-set than many of the others, and brown on the upper surface. When full grown they form pupæ, which are black, irregularly oval, and covered with blunt spine-like projections. This is the commonest species all through the year, but most numerous during the summer months in the north and north-west.

Neocalliphora ochracea.—**The Reddish-brown Blow-fly.** (No. 3 on Plate.)

This species is a somewhat rare blow-fly, and nothing is known about its life history. It is taken in the bush in the vicinity of Sydney, and included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in the plate as a distinct species of blow-fly. It is of a uniform reddish-brown tint, darkest on the head and thorax, and brighter and shining on the abdominal segments.

Sarcophaga aurifrons.—**The Grey Striped Fly.** (No. 4 on Plate.)

This typical flesh fly belongs to the allied family *Sarcophagidæ*, which are blow-flies that are often known as "Scavenger flies," laying their eggs in all kinds of offal, and on two occasions have been found in soiled wool. They are somewhat smaller and more elongate in the body than the true blow-flies, with bright red eyes, a grey thorax with three distinct parallel black bars down the centre, and the abdomen mottled with silver and black. The flies are common in the summer months, blowing dead sheep, &c., and producing slender, elongate, white maggots, which bury themselves in the ground and form very broad oval pupa cases in the soil beneath the carcase.

Calliphora occaniæ.—**The Smaller Yellow House Blow-fly.** (No. 5 on Plate.)

This is the common blue and yellow-bodied blow-fly that often comes into the house to blow meat. It is easily recognised by its bright metallic blue abdomen, being deeply blotched on either side with dull yellow, so that the middle and basal portion of the body is only blue; there is a whitish bloom on the lower half of the body very noticeable when it is blowing meat. These flies lay their eggs or maggots on meat, other food, and offal, and in the early part of the winter are very abundant in the bush, where they lay their eggs all through the winter on the soiled wool upon the sheep. The larvæ are typical, elongate, cylindrical, white maggots with small heads, hooked, black jaws, and the tip of the abdomen broadest and sharply cut off, or truncated at the apex. The pupæ are reddish brown, oval cocoons.

Calliphora villosa.—**The Golden-haired Blow-fly.** (No. 6 on Plate.)

This is the larger and more robust house blow-fly that is often found in company with the previous species, blowing meat when left uncovered in the pantry and elsewhere. Like the last species it lays eggs in the winter, but living larvæ in the summer months. The smooth cylindrical maggots when full grown form oval reddish-brown cocoons, or pupæ cases deposited under carrion. In the winter and early summer months these flies attack sheep, and lay their eggs upon the soiled wool; the maggots feed upon the substances in the wool, and when full grown fall out of the fleece on to the ground, where they pupate beneath the surface.

Lucilia tasmaniensis.—**The Island Sheep Fly.** (No. 7 on Plate.)

Though originally described from Tasmania this species has a very wide range up through Queensland, the Solomon Islands, and the New Hebrides. In the islands mentioned it has been found blowing wool on live sheep, and has done considerable damage in the New Hebrides, so that it may acquire the habit of blowing wool at any time, particularly in Queensland, where it is frequently found. Nothing is known about its life history, but in the

islands it is common along the edge of the forest wherever any decaying vegetable or animal matter is exposed. The intense shining blue of the whole of the upper surface gives it a very striking appearance.

Calliphora erythrocephala.—**The English Blow-fly.** (No. 8 on Plate.)

This cosmopolitan species, common in England and Europe, has been introduced into New Zealand and Australia, and is found about Sydney and suburbs throughout the early summer months. It is a medium-sized fly, with deep reddish eyes, a slate-grey thorax, and the abdomen blackish-brown, giving off light blue tints in a bright light. It lays its eggs in meat, and is found about the gardens on decaying fruit and other vegetable matter.

Sugar Beet under Irrigation at Yanco Experiment Farm.

Excellent results have attended an experiment in the growing of sugar beet at the Yanco Experiment Farm during the past season.

Three varieties were sown, viz., Wanzlebener, Maffra, and Giant Half Sugar White. The seed was sown in rows 4 feet apart, after it had been soaked in hot water twenty-four hours, and it germinated somewhat badly. While it was recognised that the distance mentioned was much too wide for profitable beet cultivation, 20 inches being much better, 4 feet was selected because other crops were sown the same distance apart, and this facilitated irrigating.

The plants made very slow growth until towards the late autumn, when the Maffra variety made a good deal of top growth. The plants were irrigated, and kept well cultivated during the season.

The yields per acre were:—

Wanzlebener	10 tons per acre.
Maffra	8 tons 8 cwt. per acre.
Giant Half Sugar White ...	12 tons 2 cwt. „

The roots of the last-named variety were much larger than those of the other two, some specimens weighing up to 20 lb. each.

Two specimens of each variety were submitted to the Chemist's Branch for analysis, with the following result:—

Variety.	Weight.	Percentage of sugar.
Wanzlebener	5 lb. 2 oz.	16·69
„	5 „ 11 „	18·24
Maffra	6 „ 11 „	15·34
„	5 „ 11 „	17·30
Giant Half Sugar White ...	7 „ 8 „	2·88
„ „ ...	11 „ 8 „	5·20

The roots were admittedly large and badly grown (owing to the extreme distance apart), as the best sugar beets run from 1 to 2 lb. in weight.

The percentage of sugar, however, is very good under the circumstances, and a further experiment with Wanzlebener and Maffra will be carried out during the coming season.

The Parasite of the Sheep-maggot Fly

(*Nasonia brevicornis*).

Notes and Observations in the Field and Laboratory.

W. W. FROGGATT, F.L.S., Government Entomologist, and T. McCARTHY, Assistant to Entomologist.

During the investigations that have taken place in the crusade against the house-fly in America and elsewhere, some attention has been given to the parasites which assist in keeping a check upon its increase, consequently quite a number of micro-hymenoptera have been bred from the pupæ of the house-fly and other allied species. These parasites are included in the family *Cynipidæ*, of which the minute species *Figites anthomyaruns* has been bred from the house-fly in Germany, and the family *Chalcididæ*, of which the following species have been recorded in the United States from the pupæ of house-flies:—*Spalangia niger*, *Spalangia muscæ*, *Stenomalus muscarium*, *Pachycrepoiderus dubius*, and *Muscidifurax raptor*.

In the December number of *Psyche*, 1909, Messrs. A. A. Girault and G. E. Saunders, of the University of Illinois, described a minute winged ant-like *Chalcid* under the name of *Nasonia brevicornis*, of which they bred a series of over 600 specimens, nearly all of which were bred from the puparia of different species of *Diptera* obtained about the Illinois Entomological Station at Urbana during the previous year.

An interesting account of the life-history of this little parasite is given by the authors, who, however, were not very successful in artificially spreading the parasite in the grounds of the University. Dr. L. O. Howard, of Washington, has since informed me that this parasite has also been recorded from Chili.

It is somewhat remarkable that this identical parasite, *Nasonia brevicornis*, should now be discovered in New South Wales and Queensland as a common parasite of the puparia of the blow-flies, which are known as "Sheep-maggot Flies."

Ten years ago the former of us (Mr. W. W. Froggatt) visited the west in connection with the spread of Sheep-fly maggots, and found that, wherever there was any carrion, there were, besides the Metallic Blue and Green Fly (*Calliphora rufifacies*), numbers of the shining black fly *Ophyra nigra*, and the two common blow-flies (*Calliphora villosa* and *C. oceaniæ*). The two latter at this date were known to "blow" soiled wool on otherwise healthy sheep, and although the "Metallic Blue" fly was by far the commonest it had not then acquired the habit of "blowing" live wool, and was simply found in carrion and about freshly-flayed sheepskins.

In our experiments in breeding up the parasite all kinds of blow-fly maggots were used, but it was found that the parasites showed a preference

for the smooth thin-skinned pupæ of *Calliphora villosa, C. oceaniæ,* and *C. erythrocephala,* and only infested the stoutly-spined pupæ of *Calliphora rufifacies* when the former were unobtainable.

The very noticeable decrease of the Common Yellow Blow-flies and *Ophyra nigra* in the north-west during the summer months within a few years leads the authors to think that these parasites in the first instance attacked the pupæ of those blow-flies producing smooth pupæ, and have only recently turned their attention to the harder spiny pupæ of the "hairy maggot" of *Calliphora rufifacies.*

Under natural conditions the flies and the parasites will be fairly evenly balanced. We cannot expect that the parasite will exterminate the fly, but we can reasonably hope that it will keep it in check, and so be a very important factor, wherever it becomes established, in reducing the numbers of the flies.

By artificial breeding we can spread the parasite all over the State, and if it can make good its footing in many new localities it will soon spread further afield.

The destruction of all fly-blown carcases, in which we do not find the parasite at work, will still further assist it in its work, and at the same time further reduce the pests. Poisoned baits, such as dead sheep, skins, joints of meat, or attractive chemical compounds, placed about the sheep yards, camps, tanks, or water frontages will still further reduce the pest flies, and will not in any way interfere with the work of the parasite.

Experience has taught us that every parasite has its limitations, but with these additions to the work of the parasite we should be able to reduce the pest.

The ease with which this parasite can be bred in captivity shows that, if necessary, large quantities could be artificially bred and distributed to all parts of Australia at a very moderate cost.

As will be seen by the careful observations carried out by one of us (Mr. McCarthy), who has had charge of the parasites, ten generations have been produced in the course of six months from the few hundred of parasitised pupæ originally collected at Brewarrina. Many thousands of parasitised pupæ have been supplied to stations in several parts of the State, and at the same time a stock has always been maintained in the Entomological Laboratory.

During November, 1913, in the course of investigations into the Sheep-fly maggot at Brewarrina, Mr. J. L. Froggatt, officer in charge, Government Sheep-fly Experiment Station, and Mr. W. W. Froggatt, Entomologist, on examining the remains of a dead, fly-blown animal, discovered that many of the pupæ were parasitised by a small Chalcid wasp. The pupæ were carefully collected and transferred to the camp laboratory at Brewarrina, and on Mr. W. W. Froggatt's return to Sydney he brought with him a number of parasitised pupæ for the purpose of ascertaining, as far as possible, their methods of parasitism and life history.

The fly pupæ were those of *Calliphora rufifacies*, the maggot and pupæ of which differs from those of the Common Blow-flies (*Calliphora villosa* and *C. oceaniæ*) in that they are covered with minute black spines and fringed with a row of fleshy tubercles. The pupæ were placed in a glass jar, and in about twenty-four hours the small ant-like wasps began to make their appearance in great numbers. The females, which are larger than the males, are to the naked eye of a general shining black colour, while the males appear to be ornamented with rich metallic green and bronze tints.

The tiny wasps were transferred to ordinary circular glass lamp-chimneys, plugged at both ends with cotton wool enclosed in a piece of linen cloth, as the little creatures become tangled up in the woollen fibres if the cotton wool be used alone. A narrow strip of cloth was placed inside at one end of the tube, and kept moistened with a dilute solution of honey and water.

The little parasites feed rapidly, and can be seen greedily sucking up the sweet liquid, which should act as an ideal substitute for the nectar of flowers upon which the parasites probably feed under natural conditions.

In the meantime, to obtain material in which the wasps might oviposit, several pieces of meat were left exposed in the laboratory, and were soon infested with the eggs or maggots of several species of flies, which included the Common Blow-flies (*Calliphora villosa* and *C. oceaniæ*), the Green-bottle Fly (*Lucilia sericata*), *Sarcophaga aurifrons*, and several smaller flies. As soon as infested, the meat was placed in glass jars, and the maggots allowed to develop and pupate.

The life-history of the parasite being unknown, it was at first attempted to parasitise the maggots, and although the parasites made several attempts to insect their ovipositors into the bodies of the maggots, they were prevented from doing so by the constant wriggling of the maggots.

Some fresh pupæ were then placed within the tube, and were quickly settled on by the parasites, which immediately began to lay their eggs within the pupæ by inserting their ovipositor through the pupal covering. Their sense of location is evidently very acute, as pupæ exposed anywhere in the laboratory were always found and attacked by parasites which had accidentally escaped from their tubes.

The method of ovipositing is most interesting. The female wasp spends some time crawling over and over the pupæ, constantly twitching and touching them with the antennæ as if searching for the least resistant spot to puncture. When this is finally decided she curves the tip of the body underneath the body and inserts the point of the ovipositor. The apex of the abdomen then springs back to almost its normal position, and in so doing exposes the full length of the ovipositor, which up to this time had been hidden in a groove along the ventral plates of the abdomen. The body now remains motionless, except for a slight twitching of the extremity and an occasional waving of the antennæ. The ovipositor is gradually inserted

by what appears to be the upward and downward play of the styles enclosed within the sheath.

When fully inserted it remains in that position for perhaps a minute, when she withdraws the ovipositor about one-half its length, and again pushes it in. This procedure may occur several times, until at last she withdraws the whole ovipositor, and it springs back to its former groove.

The only evidence of a puncture remaining is a small bead of clear liquid at the point of insertion, but she almost immediately turns round and sucks up the liquid, and thus leaves no visible signs of her work.

This liquid is probably used in the first case as a lubricant by bathing the styles as they work in the sheath while puncturing.

The time occupied in the whole process of insertion and partial withdrawal and the deposition of the eggs is variable, and was found to range from four to twenty-five minutes. Several attempts may be made to insert the ovipositor before deciding upon the final spot, the choice of which appears to be aided by the tactile hairs present on the apex of the abdomen.

During the process she assumes a characteristic position. The whole body is arched from the head to the tip of the abdomen, with the ovipositor not projecting from the tip, but straight from the mid-ventral surface of the abdomen.

The eggs are white, elongate oval objects measuring ·35 mm. in length and ·14 mm. wide, and are laid between the pupal capsule and the enclosing integument of the developing fly, the latter not being punctured by the ovipositor as might be expected. They are found associated in clusters of about ten, but sometimes groups of four and varying numbers up to and over ten may be found.

The eggs appear to be coated with a trace of some sticky substance, which causes them to adhere together and to the covering integument of the fly pupæ.

The eggs remains attached to the integument during embryonic development. The young larvæ hatch in about three days' time, when they measure about ·3 mm. in length. They bite through the fly integument, insert the head, and while their bodies remain outside, feed upon the juices of the fly pupæ.

As the larvæ develop the unfortunate pupæ are gradually eaten, until the full-grown parasitic larvæ occupy the space once occupied by the fly pupæ, nothing of the latter finally remaining except the shrivelled integuments.

The period of development of the larvæ occupies about seven days from the time of hatching. The full-grown larva is a cylindrical, dirty-white. legless grub, approximately 2·4 mm. long and 1·4 mm. wide, thickest in the centre and tapering towards the extremities.

The pupa is at first whitish in colour, with prominent eyes of reddish-brown, the legs and wings plainly visible, and the whole body enfolded in loosely-fitting skin, through which the outlines of the future perfect insect are plainly visible. The pupa later becomes brown and then black. The pupal stage occupies about five days.

The adults usually gnaw one hole in the puparium and escape, although two may sometimes be made.

The time occupied from oviposition to the emergence of the adult is fifteen days, but there are indications that this varies with temperature. The males characteristically appear a little before the females, and are active little creatures, continually running over and over the empty pupal cases. As soon as the females emerge copulation begins, the females being ready at once to receive the males.

From each parasitised pupa both sexes may emerge, but females for the most part predominate; it was noticed, however, in one brood the males were in such extraordinary excess that the progeny was necessarily very much reduced.

The number of parasites in each pupa varies considerably, and has been found to be as low as two, while in one instance there were as many as seventy-five, which latter batch were much smaller than the typical specimens, due no doubt to the supply of food being inadequate. In most cases, however, the number developing in a single pupa has been found to be between twenty-five and thirty-six parasites.

As the conditions under artificial breeding in the laboratory are much more favourable to the reproduction of parasites it is probable that the pupæ are much more heavily parasitised than those under natural conditions in the paddocks.

This enormous increase under artificial breeding is of great advantage, and allows of large numbers of pupæ being parasitised for distribution to people interested in wool-growing.

During the months of January, February, and March some thousands of parasitised pupæ were forwarded to sheep-owners in different parts of New South Wales.

The results under laboratory conditions, though entailing unceasing attention, have been most successful, the present brood being the tenth generation of the original stock. We have been troubled, however, by batches of the fly pupæ dying from time to time from some cause not yet established, and which causes the pupa to rot and dry up within the puparium. It seems possible that this wholesale mortality of pupæ may be due to the unnatural rolling and movement of them while being transferred from jar to jar. This may injure the pupæ in a critical stage of their process of histolysis.

The number of eggs laid by a single female parasite at one puncture has not been determined, as in all cases in which a parasite was allowed to puncture once, of from four to twenty-five minutes' duration, perfect flies developed.

In one pupa, with which one parasite had been placed in a tube and allowed to remain until death, varying numbers developed. This was perhaps due to the size of the pupa, the larger always containing the most parasites.

In twelve pupæ placed as above the number developing in each were as follows:—37, 36, 36, 36, 35, 31, 29, 16, 12, 11, 10, 10.

According to observation about twenty-five normal larvæ may develop in a single pupa of a *Calliphora,* but the adult wasps are correspondingly smaller as this number increases in the one pupa. It would also appear from our observations that all the individuals developing in a pupa are in the first place represented by a single egg, there being no evidence, as far as we could determine, of polyembryonic development.

The number of eggs laid by a female also seems to vary. One female placed in a tube with fifteen pupæ in three instances parasitised the whole, with the exception of two pupæ which had decayed. The total number developing from the one parasite in the first case was 140, in the second 148, and in the third 96. The distribution was as follows:—

Fly Pupæ.	1st	2nd	3rd
1st	8	8	1
2	12	9	2
3	8	15	9
4	13	15	7
5	14	17	3
6	4	5	8
7	13	14	6
8	7	7	8
9	3	15	14
10	8	15	10
11	7	11	7
12	6	3	3
13	14	6	7
14	9	8	11
15	14	0	0
Total ...	140	148	96

The number of broods in a year has yet to be determined, but between December and May ten broods developed under artificial conditions, which, however, may be more favourable to the parasites. Whether the number of broods would be decreased, as seems likely, under natural conditions has yet to be determined.

The parasites, on the whole, are very hardy little creatures, and under careful treatment should live several weeks.

In conclusion, it should be understood that, while this parasite should act as an important aid to our artificial methods of control, adverse weather conditions, failure of food supplies, and other limitations may reduce their value, so that we cannot hope for a complete annihilation, but should reasonably expect a considerable reduction in the blow-fly pest.

Of those distributed we need not expect to see any activity on their part until September or October, and if we can then find them established where they have been released we can claim that they have been established through our assistance in a new centre, which means a wider range and probable greater efficacy of the parasite.

Animal Parasites.

WITH SPECIAL REFERENCE TO THE SHEEP TICK (*Melophagus ovinus*) AND THE BITING SHEEP LOUSE (*Trichodectes sphærocephalus*).

WALTER W. FROGGATT, F.L.S., Government Entomologist.

THESE two external parasites of sheep under special notice have been declared a disease under the Stock Diseases Act of New South Wales, and the latter is said to be spreading all over the Australian States. The Sheep Tick was introduced into this country at a very early stage of the sheep industry, and, if compared with the Biting Sheep Louse, is not such a serious trouble to the sheep owner.

The latter, however, is a much more modern pest, and though probably known some years ago, it only commenced to be a wide-spread parasite within the last ten years, with the exception of some few districts. In the May issue of the *South Australian Journal of Agriculture*, Mr. T. H. Williams gives an interesting account of the damage the Sheep Louse is causing in that State, and figures the insect and a ram infested with lice. This shows the damage it causes, and the necessity for dipping.

The Sheep Tick (*Melophagus ovinus*, Linn.).

This curious looking insect is not a true tick. It belongs to the dipterous family *Hippoboscidæ*, containing a number of flattened leathery flies with rudimentary or aborted wings (though some are able to fly well), that infest many wild and domesticated animals and birds. Many of these are popularly known as Forest or Louse Flies, on account of their parasitic habits, and the fact that they cling to the skin of their host, or live among the fur or feathers. While some have wings all through life, others break them off, and some again, like the "sheep tick," or "ked" of the old Scotch shepherds, never have even rudimentary wings. It is one of the most degenerate species, and were it not for the absence of the additional pair of legs, might be easily mistaken for a thick-set, hairy spider. As the whole of its life is spent on the skin or among the wool of the sheep, the details of the fly structure have become modified or altered to suit its remarkable home.

The sheep tick is about ¼ of an inch in length, and is of a uniform reddish-brown tint, thickly clothed with fine hairs and scattered spines. The head is broader than the thorax, furnished with short antennæ, situated in pits on the side of the face; the eyes, small and flattened, are on the upper surface, with the mouth forming a stout tubular proboscis, stiff and hard, turned down in front, and admirably adapted for puncturing the skin and sucking up blood. The thorax is almost square, and is flattened on the dorsal surface, fitting

close against the head. The legs are stout, clothed with coarse bristles, the tarsi terminating in a pair of stout pincer-like claws. Attached to the last joint is a curious feather-like appendage, which is evidently of some assistance to the sheep tick when clinging to the wool fibres, crawling through the fleece, or moving over the skin below. The abdomen is bag-shaped, flattened, contracted at the base, and broadly rounded behind. The method of reproduction of these flies is very remarkable. They do not lay eggs or produce active maggots like other diptera. These changes take place within the female's body; she gives birth to full-grown larvæ, which, without feeding, pupate among the wool, enclosed in a flattened, rounded, dark-brown case, and attached to the wool with a sticky secretion deposited by the larvæ themselves when pupating.

Though doing no very serious damage to sheep except when very numerous, they bite sharply, and cause a lot of irritation to the infested lambs and sheep.

The Wallaby Louse Fly (*Olfersia macleayi*, Leach).

These louse flies are very plentiful upon wallabies in most parts of Australia, and frequently crawl upon the kangaroo dogs after they have run down and killed the marsupials The dogs in turn are very unhappy, for, do what they will, they cannot rub them off; the more they rub, the closer the louse flies cling to the dog's skin with their powerful pincer-like claws.

This fly measures slightly under half an inch in length to the tip of the closed wings. The centre of the head is yellow; eyes, dark reddish-brown; thorax, dark brown, shaded with yellow: legs and abdomen, brownish, strongly shaded with green; wings, grey to dark brown, with darker nervures. This fly has the typical form of the group the head, in front of the eyes, is produced into a prong or divided process standing out in front, with the two-jointed antennæ half hidden in the pit on either side; the large eyes somewhat elongate, angular in front. The thorax is smooth, shining with scattered hairs on the margins; a pair of oval plates, covered with short spines that extend to the centre of the back. The legs are large, with short tarsi, thickly spined and terminating in a pair of hooked claws. The wings are long, rounded at the tips, folded over each other, showing the stout simple nervures. The abdomen is somewhat heart-shaped, broadest at apex, and slightly lobed. The whole insect is flattened on both the dorsal and ventral surface; and the integument is stout and leathery, well adapted for moving about among fur and hair.

The Forest Fly (*Hippobosca equina*, Linn.).

Though a number of our native birds are infested with louse flies, this species, which is very common in the open forest country of Europe and Great Britain, and is also recorded from the Canary Islands and Africa, is not found in Australia.

Miss Ormerod gives an exhaustive account of this horse fly in one of her annual reports, and has described its habits in the South and West of England, where at times it is very plentiful. They infest the local horses, which do not take much notice of them; but they are a great nuisance

to people travelling through the infested country, for, as soon as they alight on a strange horse and cling to the skin with their pincer-like claws, the horse gets frantic with fear of the unknown parasite.

These flies were first described from the New Forest in 1761, and Miss Ormerod's report gives a graphic account of how they swarmed in Wales, Hampshire, and Dorsetshire in the summer of 1895. There are two indigenous species of these flies described from New Caledonia, one of which was accidentally introduced into Sydney with a racehorse imported from Noumea in 1900; but the specimens were very fortunately captured by Mr. E. Stanley, Chief Veterinary Inspector, upon his pony, to which they had transferred their attentions.

The late Mr. Henry Copeland, during a visit to New Caledonia in 1895 encountered this louse fly; and, upon his return to Sydney, he gave a graphic account of the "flying tick" which drove horses frantic on that island. This creature, he was informed, had been introduced from Algeria some six years before, and had since that date spread all over the island.

He called the attention of stock owners to this new pest and to the danger of its introduction into Australia; and he suggested the advisability of sending an entomologist to New Caledonia to study its habits, and get some idea of how to deal with the pest. He stated it was a little longer than the house fly, and gave a very good account of its general form and habits.

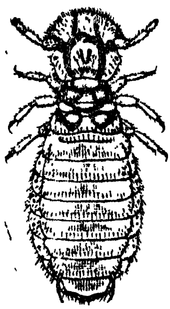
A few days after Mr. Copeland's report was published one of the Sydney newspapers produced a figure of this fly over 2 inches across the outstretched wings, with the statement that the illustration was half natural size, so that the "flying tick" appeared to be a very formidable intruder to attack. This fly measures about ¼ inch in length to the tip of the body, but the wings are a little longer. The general form and structure is like that of the wallaby louse fly—flattened, smooth, shining, and covered with coarse bristle-like hairs. The legs are stout, spiny, and furnished with a pair of pincer-like claws at the tip of the tarsi. The general colour is dark-brown shaded with tawny yellow, with the whole of the leathery integument smooth and shining.

The specimens from New Caledonia seem to be identical with or closely allied to *Hippobosca equina* of Europe.

Anyone who has ever had the large louse fly which infests the Topknot fruit-pigeons, alight upon the back of the neck when out shooting in the coastal brushes, can understand the feelings of a horse when one suddenly alights upon him and hangs on with its business-like nippers.

The Biting Louse of the Sheep (*Trichodectes sphærocephalus*, Nitz.).

Originally described under the name of *Pediculus ovis* by Linnæus, as a pest upon sheep in Europe, this tiny parasite has been spread all over the world with its host, the domestic sheep. From England it was introduced into Canada; it soon spread over the United States, and is now common among New Zealand and Tasmanian flocks, whence it probably came into New South Wales, and is now a common and very serious pest in many parts of the Australian Commonwealth. Dipping, to get rid of it, has been



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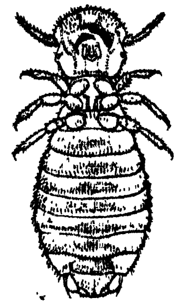
Dorsal view.



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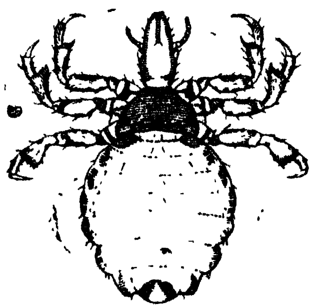
Ventral view.

The Sheep Louse (*Trichodectes sphærocephalus*).



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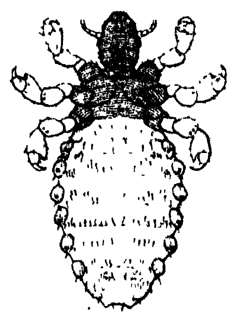
The Sucking Hog Louse
(Dorsal view).
(***Hæmatopinus urius***).



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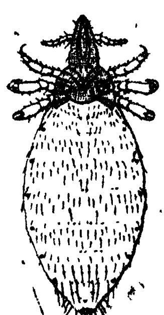
The Short-nosed Cattle Louse
(Ventral view).
(***Hæmatopinus eurysternus***).



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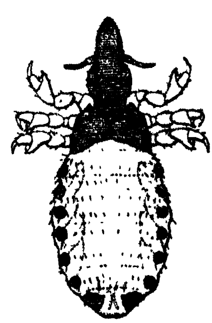
The Long-nosed Cattle Louse
(Ventral view).
(***Hæmatopinus vituli***).



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The Horse Louse
(Dorsal view).
(***Hæmatopinus asini***).

ANIMAL PARASITES.

carried out on many of our sheep stations; but as many flock-owners have neglected this precaution, dipping has been made compulsory in most of the States.

The sheep louse lives in the wool, close to the skin of the infested sheep, where it deposits its eggs, often known as "nits." From this the perfect semi transparent louse emerges and gradually increases in size until fully developed.

This species is a typical semi-transparent to yellow-coloured louse, with darker transverse bands through the middle of each segment. It is distinguished from most of the other species by its almost circular hairy head, the mouth parts in the under surface in a line with the basal joint of the antennæ, three-jointed antennæ, and no eyes. The thorax appears to be formed of two parts, the metathorax forming a more or less slender neck between the main part of the thorax and abdomen. The three pairs of legs are short and spiny, with the tibia broad at the extremity and furnished with two incurved claws, which are used as pincers for clinging to the wool. The abdomen is elongate, oval, with the segmental division well-defined. Length, 1·7 mm.

The Sucking Hog Louse (*Hæmatopinus urius*, Nitz.)

This is a very common parasite upon pigs in New South Wales. It has a very wide distribution over the world, and has been easily introduced with pigs into new countries. According to several authorities, it was recorded from England in the thirteenth century. Linnæus first gave it the name of *Pediculus ovis*, but later on Nitzsch gave it the present one, which has been generally adopted.

It is common in Ireland, found in England, and is very plentiful at times in the hog ranches of the United States. It is a somewhat active creature for a parasite, creeping about among the bristles, clinging to them, and to the skin, when one tries to remove it.

This is one of the largest and most thick-set members of the family, measuring about a quarter of an inch in length. It is of a uniform greyish-brown tint, with the outer margins of the head, thorax, and abdomen darker. The head is long, cone-shaped at the tip, and broadest behind the antennæ: the thorax small, with the legs large, stout, and furnished with pincer-shaped claws, admirably adapted for clinging to its host. Osborn says, "There is a curious provision in the feet for strengthening the hold upon the hair, which does not seem to have been hitherto described. It consists of a circular pad-like organ or disc in the outer portion of the tibia, which is received in a conical cavity in the end of the tibia, and which can be forced out, so as to press upon the hair held between the claws of the tarsus and the end of the tibia."

The infested pigs can be easily cleared from the Hog Louse by spraying or washing with a carbolic, or oil wash, or an arsenical dip spray, as is used for the cattle tick. Pigs that have plenty of dry dust in which they can root and roll, are said to soon clean themselves.

The Short-nosed Cattle Louse (*Hæmatopinus eurysternus*, Nitz.).

This and the following species are not uncommon parasites of cattle in many parts of Australia, and, when very thick upon the skin, they sometimes cause the hair to thin or come out in patches. Cattle in good health and under proper sanitary conditions are not much troubled with this parasite. They are easily removed with a little care by spraying or washing the infested beast with benzole, carbolic, or kerosene emulsion spray.

This Cattle Louse has a short diamond-shaped angular head, with short antennæ standing out on either side; the broad thorax rounded into the abdomen segments on the sides; with the typical short stout legs terminating in pincer-like tarsi. The abdomen, which varies much in the starved or full fed louse, might be defined as flask-shaped.

The head and thorax in living specimens are yellowish, with the abdomen having a bluish tint. It measures up to $\frac{1}{8}$ inch in length. This parasite is well known in America, and a very comprehensive account of its structure and life history is given by Osborn in "Insects affecting Domestic Animals," in Bulletin No. 5 (New series), Division of Entomology, Department of Agriculture, Washington, 1896.

The Long-nosed Cattle Louse (*Hæmatopinus vituli*, Linn.).

This Cattle Louse is not uncommon in Australia, and from time to time specimens are sent into the office by cattle owners for determination. It is easily separated from the preceding species by its elongated form; for though about the same length ($\frac{1}{8}$ inch) as the Long-nosed Cattle Louse, its head is an elongate oval, longer than the elongated thorax, while the legs are very stout and long, with the abdomen elongate oval in form. In colouration it is very similar to that of the previous species, but when preserved on micro. slips, it changes to the usual yellowish-brown tint of mounted specimens.

The Horse Louse (*Hæmatopinus asini*, Linn.).

This is the common louse of the horse and ass, which has a wide range over the world, and is not uncommon in Australia. It has a narrow elongate head, the abdomen short and oval, a little longer than the rest of the body. General colour, yellowish, with darker reddish-brown tint. Length, from 2 to $3\frac{1}{4}$ mm.

REFERENCE TO PLATE.

. *Melophagus ovinus*, Linn.—Sheep Tick, drawn from a micro.-slide, showing details of structure.

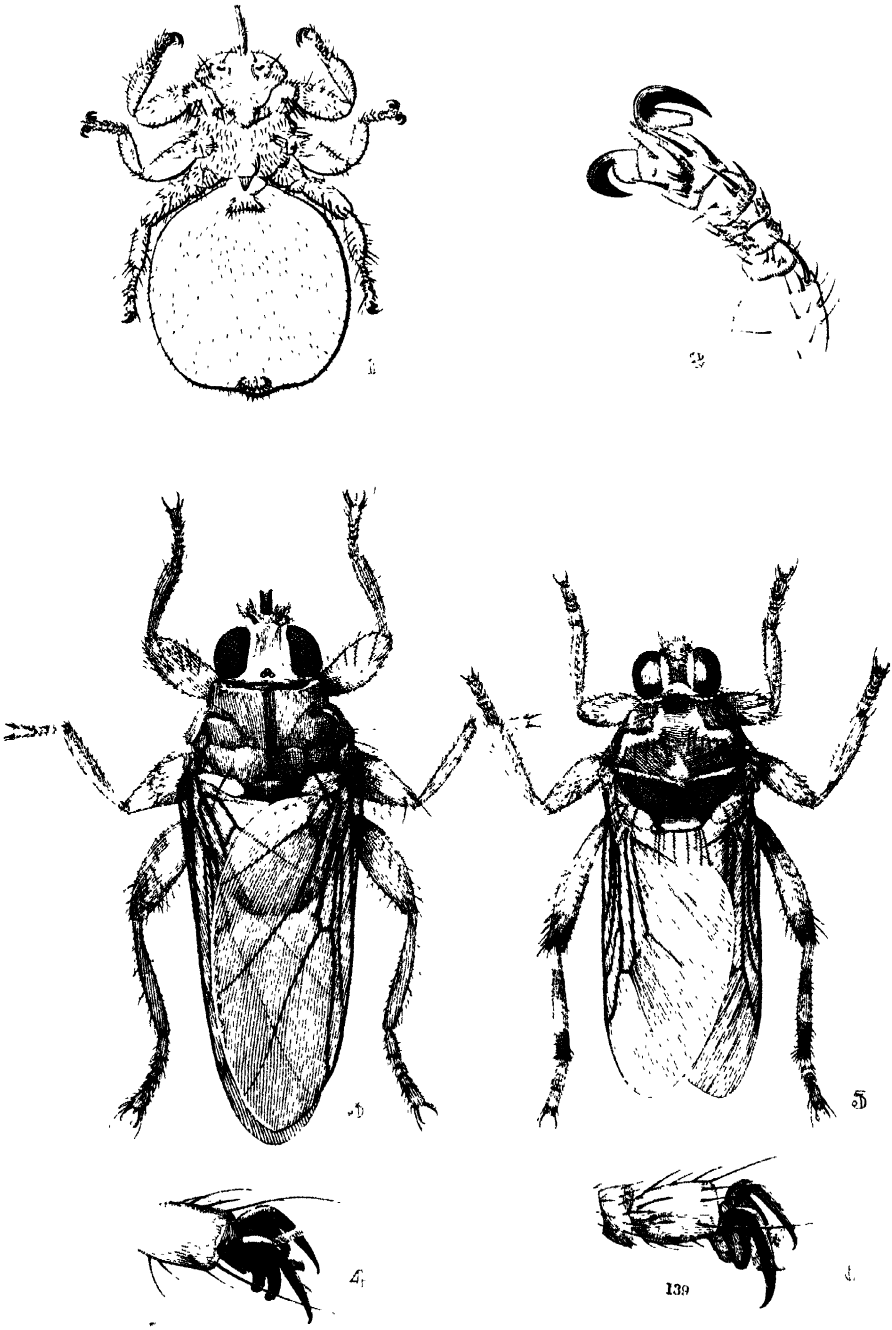
2. *Melophagus ovinus*, Linn.—Foot, showing claw and process between, supposed to be used for holding on to wool.

3. *Hippobosca equina*, Linn.—The Forest Fly, infesting horses.

4. ,, ,, ,, —Foot, showing claws and feather-like process used to hold on to the hair.

5. *Olfersia macleayi*, Leach.—The Wallaby Fly.

6. ,, ,, ,, —Foot, showing structure of claws.



ANIMAL PARASITES.

The Construction of Sheep Dips.

A BROOKS, Works Overseer, Department of Agriculture.

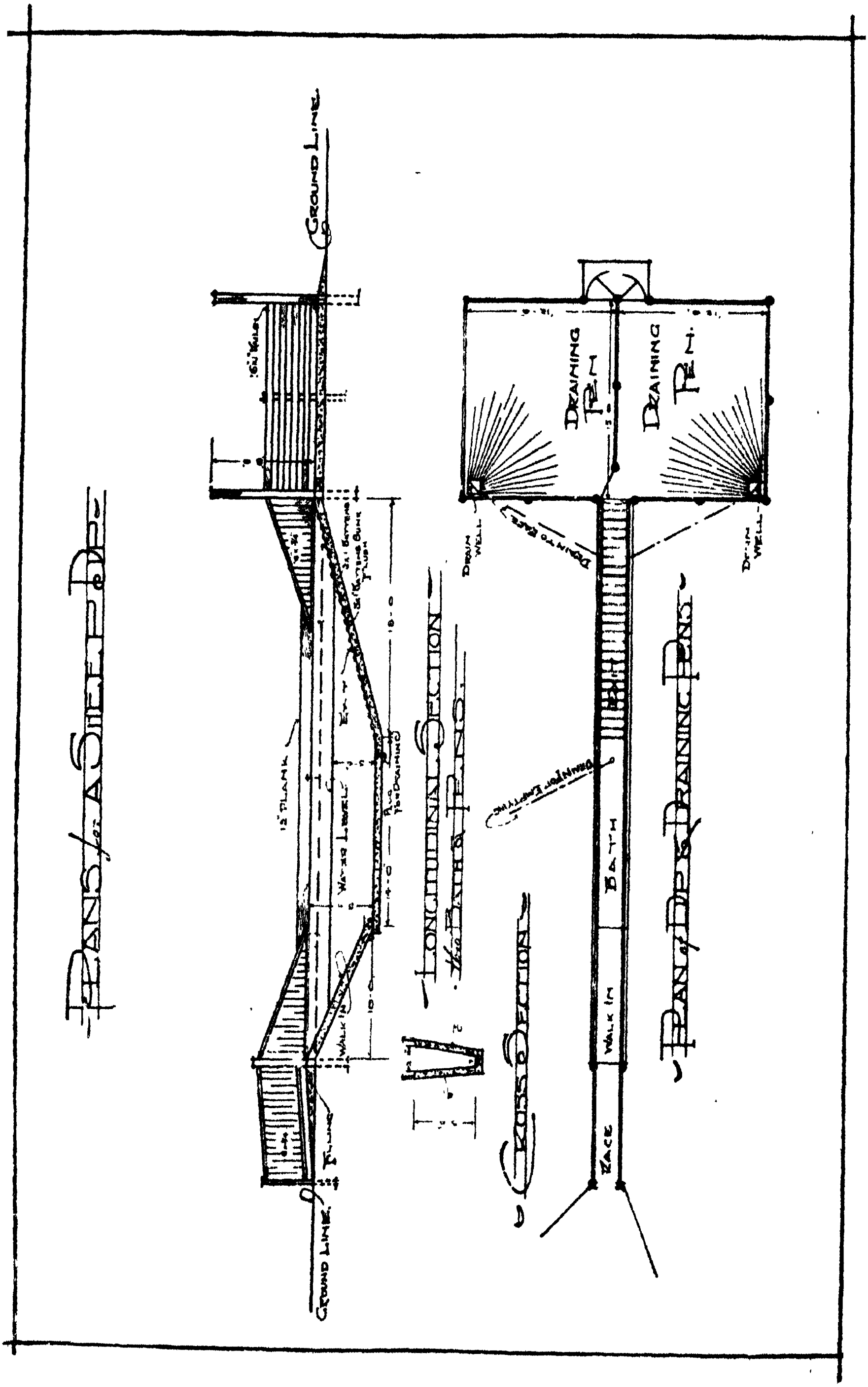
THE plan here given is suggested as suitable for the smaller flocks, and having the "walk-in" rather than the plunge, is also suitable for dipping pigs. It may be attached to any yards that are already in use, a race with inclined entrance to dip being all that is necessary. At the exit the draining pens should be constructed as per plan, and if the site happens to have a suitable slope, with the pens placed on the highest ground, the floor would be not more than 3 to 4 inches over ground level. It is suggested that the main posts of the pens be high enough to take the roof timbers, whenever it is desired to provide a covering, but in some districts this may be dispensed with.

The dimensions of the dip are: 40 feet long on the top, 14 feet on the bottom, 2 feet, and 9 inches wide respectively, and if filled to a depth of 3 feet 6 inches will hold about 750 gallons of dip.

A drain is provided by fitting in the bottom, where indicated, a brass plug and washer, the plug having a strong solid ring-bolt that can be hooked to remove when required. A cheap drain from the dip can be of 2-inch galvanized iron pipe, embedded in about 1½ inches thick of concrete, and terminating at some distance away at the surface of the ground or into a well, about 8 feet deep and 4 x 4 feet, and if the soil happens to be of a sandy nature, the liquid will soon soak away. The concrete for the dip should be of 1½ inch stone (not larger), coarse clean sand and cement, mixed in the proportion of 9 cubic feet of stone, 4 cubic feet of sand, and 1 bag of cement, properly mixed together, and placed in prepared boxes, allowing a thickness of 6 inches for walls and 9 inches for the bottom. The boxing can be made with the boarding that is intended for the wing walls, nailed temporarily to ledges of the same stuff. The excavation should be carefully cut out to the shape of the dip, so that a regular thickness of concrete will be provided for.

In districts where bricks may be more easily obtained and handled than concrete, the dip may be constructed with 4½ inch walls, the bricks being well wetted and laid in mortar of 3 parts clean sand to 1 part cement, used fresh, and all joints well filled up. On the bottom and the slopes the bricks should be laid on their edge, with sand about 1 inch under them.

Bolts should be set in the top edge of the concrete walls to secure the lowest points of the framing to take the wing fence boarding, and the whole internal face of the dip should be plastered smoothly with cement mortar, made of 2 parts clean sand to 1 part cement, put on before the concrete dries, and as soon as possible after the boxing is removed. On the slopes it would be a good plan to embed old wire netting in the concrete. The


Plans for a Sheep Dip
Longitudinal Section
Cross Section
Plan of Dip & Draining Pens
Ground Line
Ground Line
12' Plank
Water Level
Walk In
Draining Pen
Draining Pen
Drain Well
Drain Well
Drain to Race
Bath
Walk In
Race

surface of the walk-in should be finished off rather roughly, and the walk-out have either the battens for foothold as shown, or ridges may be made in the finishing coat of cement, but either must be about 3 inches short of the sides all the way up.

The draining-pens are constructed with round posts, and sawn 6 inch x 1½ inch rails, the corner and centre posts standing 8 feet high to take roof timbers if required. The floors are of concrete, sloping towards and drained to small wells about 6 inches deep, having protecting gratings on top, straining the liquid before it enters the return drains of 1½ inch galvanized iron pipe back to dip. Around the outer edges of the floors is provided a ridge about 2 inches high, also made in cement. The ground under these floors should be well rammed and levelled off to take the concrete, and wire netting may be put into the concrete, as mentioned for the dip. If this is done, the thickness may be reduced to 3 inches. The probable cost of this work would be about £50.

A Scotch Dipping Bath.

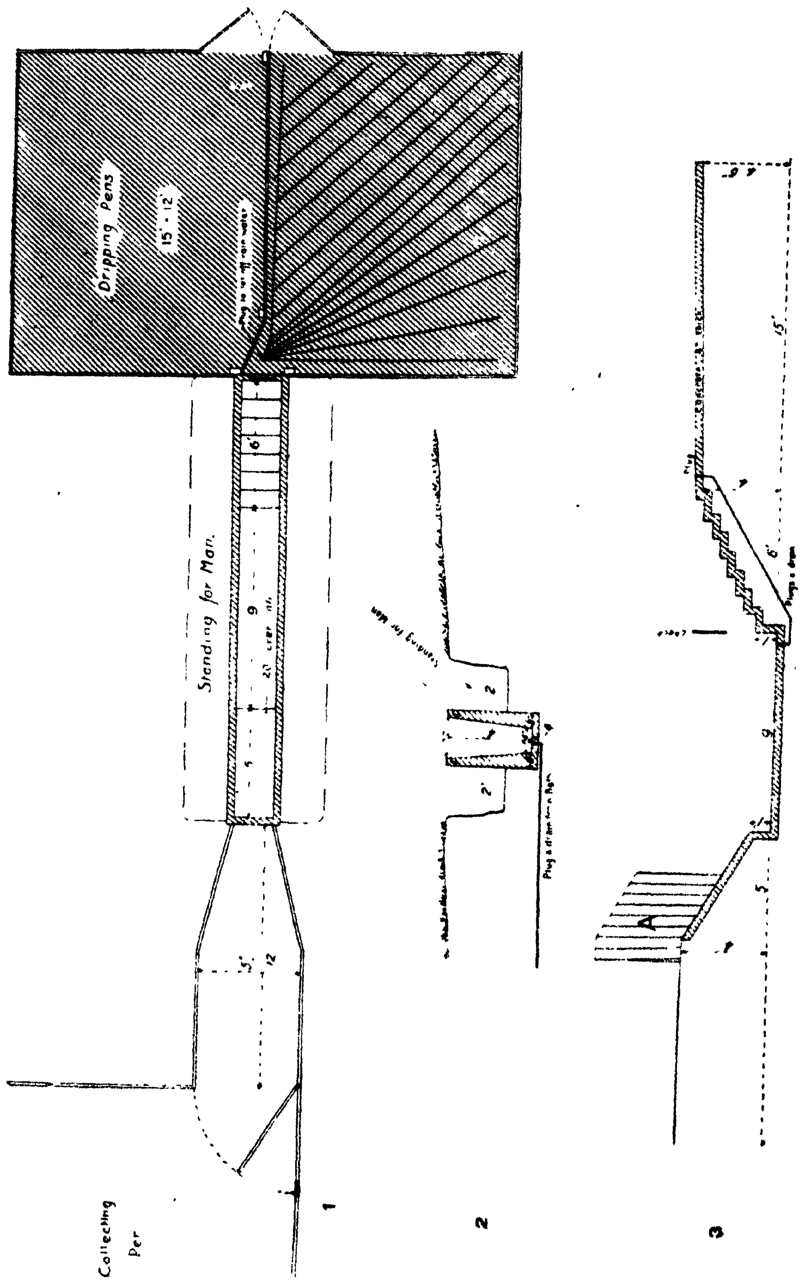
The following plans have been supplied by Mr. Robert Ament, Experimentalist at the Bathurst Experiment Farm.—

This dipping bath was designed and erected for the Home Farm, Rosneath, N.B., and subsequently became the standard bath in a wide district in Dumbartonshire and Argyleshire.

The bath is 20 feet in length, the width being 22 inches at the top and 14 inches at the bottom, with a capacity of 370 gallons, and built of concrete 1 in 7. The sides taper from a thickness of 8 inches at the bottom to 4 inches at the top. The bottom and ends are 4 inches thick right through. The exit is made in a series of steps, 10 inches deep by 5 inches high, affording a surer foothold than the wooden ladder, and is very little more trouble to make. Beside the bath are standing places for a man or men, dug out 2½ feet deep. These need not be carried further back than the bottom of the slide. The dripping pens are each 15 feet x 12 feet, laid with 4 inches of concrete, scored on the surface, and with a fall towards the bath to a drain fitted with a plug to let off rain-water. This drain is also made to carry away contents of bath when it is necessary to clean out.

At Rosneath the walls round the dripping pens were built of concrete, 4 feet high and 4 inches thick. This would cost about 30s. more than wooden fencing, but makes a much better job. The plan shows wooden fencing.

In the collecting pens, allowance is made for two pens or yards, equal in capacity to four times the two dripping pens. The inner yard opens to a forcing pen 12 feet x 5 feet, narrowing to the width of the bath, as shown. At the entrance to the bath is a hood, made of wood, 3 feet 6 inches high at the "take-in," and sloping down to the bath at the same angle as the slide. This prevents a good deal of splashing, and also prevents sheep from leaping sideways over the bath. Inside the hood, a bag or light wooden shutter is hung from the top to prevent the sheep seeing the bath.



1.—Plan. 2.—Cross Section. 3.—Longitudinal Section.

A Scotch Dipping Bath, used as a standard in Dumbartonshire and Argyleshire.

Across the bath, in the position indicated, is hung a check, to ensure the sheep remaining in the dip a full minute.

As many as 600 sheep have been put through this dip in the course of a morning.

Cost.

The bath and dripping pens, together with a 60-gallon boiler set in brick-work, with 12-foot flue, were erected for the sum of £20. The estimated cost in New South Wales, reckoning on a handy supply of gravel and a convenient site, would be:—

	£	s.	d.
Concrete work (allowing an extra yard for contingencies), 8 yards, at 25s.	10	0	0
Excavations, 25 yards at 1s. 8d., say	2	2	0
Fencing dripping pens and forcing yard, and providing gates	8	0	0
	20	2	0
Or, with collecting pens (two, 30 x 24 feet)	10	0	0
	£30	2	0

These prices are based on the supposition that, where possible, farm labour is used.

Methods of Transport of Fruit to Sydney Market.

Representations have recently been made by the Department of Agriculture to the railway authorities, urging that an improvement be made in the methods of transport of fruit to the Sydney market.

In reply, the Railway Commissioners stated that this was a matter which had frequently been under consideration, and as the result of careful inquiries it appeared that the present means of transport by means of ventilated louvred vans was, generally speaking, satisfactory. These vehicles were the most suitable for the conveyance of soft fruit, and it was considered that considerable risk of damage to the fruit would be incurred if soft fruit were carried in insulated chambers unless the fruit was first properly precooled and then suitably packed. Some time ago a request was made by a Fruitgrowers' Association for a refrigerator car to be placed at their disposal for trial purposes in connection with the carriage of fruit, but, so far, no steps have been taken by those concerned to test the utility of that particular type of vehicle.

As to transit arrangements, it is pointed out that instructions to the staff are that soft and highly perishable fruits carried over long distances may be forwarded by express, mail, and through passenger trains at goods rates, and, in addition, the staff have special instructions as to the trains by which fruit should be forwarded in order to avoid delay, and also in regard to the care that should be taken in its handling and loading.

Particulars regarding the instructions referred to may be obtained on application to the local station-masters.

Sheep Yards for Small Flocks.

H S. MAJOR, Assistant to the Sheep and Wool Expert.

THE number of sheep to be handled at different times of the year and the varying requirements of flock-owners will decide the size and design of yards.

In estimating the sheep capacity of any yard enclosure, allow 4 square feet per sheep: thus a pen 10 feet x 10 feet will hold comfortably twenty-five adult sheep of average size.

On a small property one drafting yard adjacent to the wool-shed generally meets all the demands for the convenient working of the flock; but on extensive stations it is usual for several yards to be centrally situated about the big run. In any case high ground—gravelly for preference, to lessen the dust—should be chosen. Some sheep yards are built up 3 or 4 feet above the ground, and floored with battens. This is expensive, but the total absence of dust more than compensates for the initial cost. The value of wool is considerably lowered when sheep are shorn immediately after leaving very dusty yards. It will always pay to hose the yards, or use the fire-cart where water is not laid on.

Wire fences and netting or cyclone fencing are unsuitable for sheep yards Posts and rails, rails and palings, nailed on the outside, and, where such timber is plentiful, native pine saplings arranged block and rail fashion, make good fences. The latter are very serviceable, and are often the cheapest Fences should be about 4 feet high.

The arrangement and construction of the drafting race, drafting gate, and check pens are of the greatest importance.

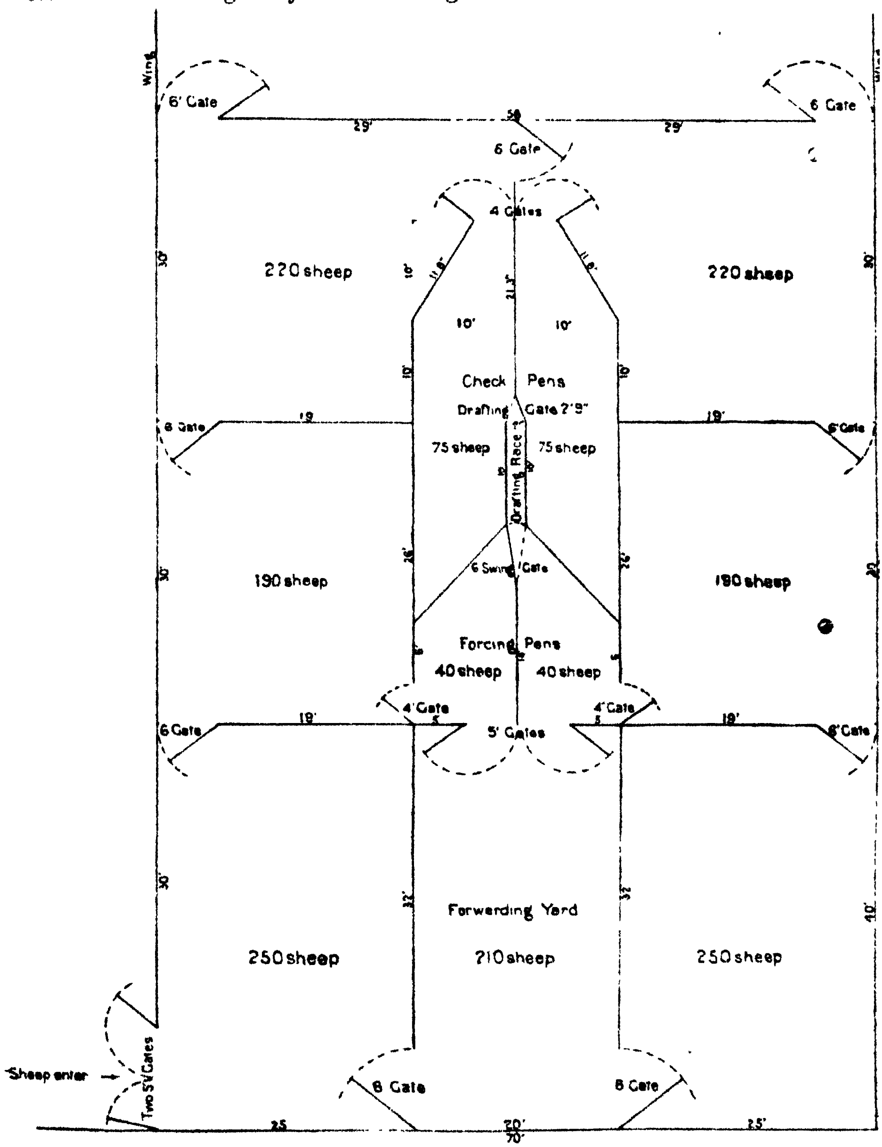
Two separate forcing yards used alternately are better than one, as they assist the "yarding-up," and the sheep follow on up the race with greater regularity. The swing gate between the two forcing pens, and at the entrance to the race, should be about 6 feet wide, as otherwise a short 3 feet gate will make a narrow neck, and cause the sheep to crush too much when entering the race.

The race should be 10 or 12 feet long, about 3 feet 6 inches high, and boarded along its whole length with smooth timber, such as dressed pine, running with the grain so as to give smooth inside surfaces.

It is obvious that big crossbred wethers will require a wider race than the very small Merinos of our cold tableland districts. There should be room for one sheep only to advance. A race 20 inches at entrance, and gradually narrowing to 15 inches at the exit end, will meet average requirements.

The drafting gate should be light, but strong, and boarded up. There should be plenty of room for sheep to get clean away, and a gate 2 feet 9 inches wide and 3 feet 6 inches high is about correct. The gate should hang freely on a top and bottom pivot, driven into a strong post in the middle line of the race. The gate should be suspended about 3 inches off the ground, and when shut against either side post of the race the front edge of

the gate should be flush with the inside of the drafting race. The ground at both ends and along the drafting race should be floored with rough timber, placed crossways. This will give the sheep a better footing, and prevent the earth from wearing away and becoming a channel for storm waters.



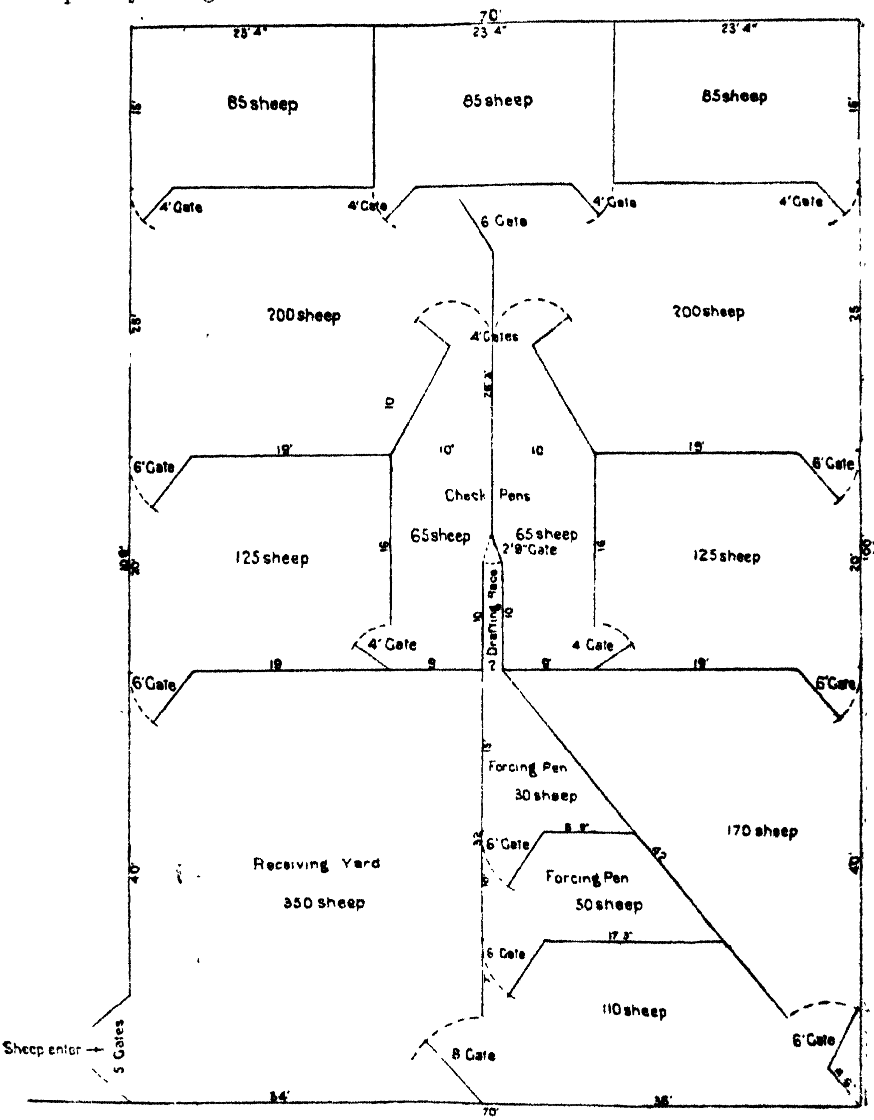
No 1 PLAN OF DRAFTING YARDS

for small flock owners

Dimensions 100'x70'

Estimated capacity - average sized sheep - 1700 sheep

In such yards as may be away from the wool-shed and some distance from water, a little corrugated iron roof built over the race and drafting gate, and a small tank placed in the check-pen corner, will be very welcome accessories, especially during the summer months.



No 2 PLAN OF DRAFTING YARDS

for small flock owners

Dimensions 100' x 70'

Estimated capacity - average sized sheep - 1700 sheep

The Field Selection of Seed Maize.

H. WENHOLZ, B.Sc.Agr., Grafton Experiment Farm.

THE practice of selecting seed maize in the field is far from being as general as it should be in this State. Most of the selection that is done still takes place, not in the field, but in the barn at husking time.

By the latter method one may, to a certain extent, keep to the type he has in mind, as far as the form of the ear and grain is concerned, but the maintenance or increase of the yielding capacity should be, at least one of the chief considerations, if not the foremost, in the mind of every grower; and it must be recognised that the selection of the best-looking ears and grain from the barn is not the surest method of improving the maize crop in this direction. We have not yet reached that stage at which we are able to give definite information regarding the type of ear in relation to yield, but we can get some indication of its inherent yielding capacity by an observation of the field conditions under which it was produced. For instance, what a treasure is a good ear, or even a fair ear, of maize produced under adverse conditions!

Farmers have urged that they have not the time to go through their field and do this selection, whereas the method of selecting ears in the barn when husking entails no extra call on their time. But when it is fully realised that the little extra time and trouble devoted to this work is amply repaid by the greater success achieved, this objection must be brushed aside. Putting the increased yield at a low estimate, say, 5 bushels per acre, it means that an increase of about 17s. per acre is obtained at a cost to the farmer of selecting from ten to twenty ears in the field. It is hoped that with the increased use of the combined husking and shelling machine, this practice of barn selection, which is merely time-honoured, will die out, to be replaced, not by dependence on a neighbouring "barn selector," but by field selection from one's own standing crop.

When one happens on a particularly good ear in barn selection, it is put aside and its grain shelled and planted, in all good faith that such grain will produce equally good ears. But although the principle that "like begets like" is true to a large extent, it cannot be said that the first "like" is fully known, when one is wholly ignorant both of the conditions under which it was produced and of many of its transmittable characters, viz., its field characters. For instance, a "particularly fine" ear of maize is probably one which has had "particularly fine" conditions for its growth, such as ready access to an abundant supply of moisture and plant-food material. Given these conditions the following year it will certainly stand a large chance of "begetting its like." But a good ear produced under these good conditions cannot be expected to "beget like" under ordinary or slightly adverse

conditions. This is where barn selection fails. It takes no cognisance of field conditions; and a large ear produced by a plant which has been growing in the field with a large amount of space around it can only be expected to yield as well as its progeny if the latter are given the same amount of space. And it may also happen that good ears selected in the barn may have undesirable field characteristics, which, not being known to accompany such ears, are being perpetuated or even increased. Such characteristics besides decreasing the yield may be also increasing the cost of production, and this aspect should never be lost sight of.

Amount of Space occupied by individual Plants.

Blank spaces are caused in drill-planted maize through the failure of some grains to germinate, the death of some plants while young, and the lack of uniformity in dropping grains regularly by the drill, the latter being due in its turn largely to the use of ungraded or insufficiently uniform seed. Where the grains or plants have "missed on one or both sides of individual plants, such a plant has a decided advantage. Again, where only one grain has been planted in a "hill," the plant arising therefrom has a distinct advantage over one of the plants in a hill where two or more grains have been sown. This advantage is due to (1) a larger supply of moisture and plant-food material, because of the increased foraging space afforded to the roots without competition; and (2) a greater amount of leaf area exposed to the sunlight. This increased amount of sunlight on the leaves means, of course, greater transpiration of moisture from the plant, greater absorption of plant-food material by the roots if sufficient moisture is available, and increased transformation of the plant-food material into elaborated products which the plant uses in building up its tissues. The value of sunlight is recognised by some farmers who plant a few rows of maize and then a row of pumpkins; but these farmers must bear in mind in making their field selections that the outside row of maize next to the pumpkins has an advantage in position which its progeny may not have the following season, and that therefore it would not be wise to select from this now solely because of apparent vigour.

On the other hand, there exists, especially in maize, such a characteristic as inherent vigour, and this is possessed by the plant which is able to produce either a normal ear under adverse or crowded conditions or a large ear under normal conditions.

By field selection then, one is able to select ears from such plants, and to avoid the normal and large ears produced under abnormally good conditions. Observance of this rule alone in selection will increase the yield materially, and eliminate much of the surprise and annoyance at unexpectedly low yields from barn-selected "good seed."

Height of Stalk.

A tall and vigorous plant will nearly always be found where it has extra space due to an advantage in position, as, for example, next to a "missed" hill, or on the outside edges of the field, or at the ends of the drills. As

stated before, such plants should be passed over in selection. There will, however, sometimes be found plants growing in quite a normal position which tower above the rest. It might be thought that the ears from such plants would be worth selecting, but it was a noticeable fact, especially in late maize at Grafton last season, that abnormally tall and vigorous plants were never found to contain the best ears. In fact, there seemed to be a correlation between very strong tall stalks, thick long husks, and poor ears, with large core and shallow grain. As such ears would never be selected for seed maize, and yet they had apparently no advantage in position, they would be worth testing to see if their progeny yielded any better than the average for green fodder. Such stalks were mostly found in Improved Yellow Dent, a late variety, and it is quite probable that if selection were carried on in two directions—grain and fodder—with this variety, the resultant strains would differ widely in many characteristics. In view of the increasingly large amount of maize grown for green fodder for dairy cattle on the North Coast, and of the splendid reputation Improved Yellow Dent already has for its yield of such, selection in this direction is probably worth a trial, especially by those dairy-farmers who grow maize almost exclusively for this purpose. Attempted by farmers who grow maize chiefly for grain, and who rely on their own seed selection each year to improve their grain yield, the selection of a fodder strain would be dangerous unless precautions were taken to prevent cross pollination with the grain crop. This may be done either by isolation (at least 400 yards between the two crops), or by an earlier or later planting, with at least three or four weeks intervening.

Although the kernels from such ears selected last season at Grafton are shallow as compared with the type of Improved Yellow Dent grown for grain, they were, in most cases, broader and thicker. The vigour of the young plant is intimately associated with the size of the kernel planted, those plants being usually more vigorous in their young growth which have sprung from the largest grain. This is only to be expected, as the young plant depends largely on the store of nutriment in the seed for the first week or so. But though the lead so gained will tend to be kept up, the inherent vigour of the individual, which is probably expressed as the foraging power of the roots characteristic of the strain, must also be a large factor in the future development of the plant.

Suckering or Stooling.

Although it is generally conceded that the season is a large factor in determining the amount of suckering in a crop, there seems to be little doubt that heredity also plays some part. In ear-to-row tests carried out at Grafton last season in which the grains were dropped singly by hand, the percentage of suckering in the different rows varied from 17 to 66, and the highest yielding rows were those which had a small percentage of suckers. In addition to this, the best ears were almost invariably found on stalks which bore no suckers. The percentages given here are rather higher

than what would occur in an ordinary field crop, for, in the latter case, the maize planter does not drop the grains singly but two or more sometimes in one place. When suckering occurs in these hills it is more likely to be hereditary, and the ears produced on such suckers are seldom of any size. In selecting ears in the field, it is preferable to make a distinction between suckers which bear fair-sized ears and those with ears carrying only a few grains or those completely barren. A useful distinction in taking field notes is to call the former "stools" and the latter "suckers." Then, using this differentiation, a normal ear obtained from a stalk bearing one or two "stools" would be better to select than a similar or equal ear from a stalk which had one or two "suckers," other conditions, of course, being equal. The former plant in this case has produced as good an ear as the latter in spite of greater competition, and can be considered to have greater inherent vigour. In drill-planted maize where two or more grains are sometimes sown per hill, distinct plants cannot be distinguished readily from "stools," unless the whole hill is rooted up. To avoid this trouble, the same designation may be applied, and for the purposes of selection, separate plants in the same hill may be called "stools." A study of the heredity of "stooling" or "suckering" propensity is, of course, best done by dealing solely with single grains planted by hand.

That the season also has a large influence on suckering was noticed last season at Grafton, December-sown maize suckering much more freely than maize of the same variety planted in October, which passed through a much drier period during its early growth.

Besides the influence of heredity and the season on suckering the fertility of the soil and the space occupied by individual plants are also contributing factors, and if suckers are of any economic value at all, it is in helping to thicken the stand where the planting has been too thin or where the germination has not been good.

Another disadvantage of suckering noticed last season was the large percentage of plants bearing suckers lodged by a wind and rain storm in June. This is probably due to the greater resistance offered by such plants to the force of the wind, and consequently the greater force exerted on the roots.

It has been said that there is a correlation between the number of ears produced on a stalk and the amount of suckering—plants which bear two or more ears per stalk having a tendency to produce suckers—but this was not noticed to be the case last season at Grafton.

Number of Ears per Stalk.

This is also greatly influenced by the space around the individual plant. Under normal conditions, however, it is influenced by the fertility of the soil and the length of the growing season, but is also largely subject to heredity. Field selection is of considerable value in modifying this characteristic to special requirements, and even using it as a means of increasing the yield.

If the soil is sufficiently fertile, two medium-sized ears may often be grown on a stalk under normal conditions, which, however, taken singly would not

be good enough to compare with a good ear selected in the barn, and they would therefore be passed over. Since the two medium-sized ears would, in all probability, outweigh the best single ear that could be produced under the same, and probably also, under much better conditions, and since a fair percentage of two-eared stalks could be relied upon in the progeny, it seems as if there is room for this method of increasing the yield on rich soils with a late variety in a long growing season. But where either the season is short, or the variety early, or the soil not very fertile, it would probably be better to select for a single ear per stalk.

The objection to a stalk bearing two medium-sized ears in place of one good one is that the cost of harvesting and husking is increased, but where a combined husker and sheller is used, there is practically only the extra cost of pulling to be reckoned with, and it is doubtful whether this should be serious enough to discourage the production of two ears per stalk under conditions before mentioned, if increased yields can be obtained in this way.

For a variety of maize to be used exclusively for silage or for green fodder, two or more ears per stalk are usually to be preferred, as the ears are smaller and pass more readily through the rollers of the cutting machine, and if, as mentioned before, there is a tendency for the stalks with two or more ears to produce suckers, the yield of green fodder will most likely be increased. But in a short season, where an early variety has perforce to be grown, the ears are not likely to be of sufficiently large size to cause trouble on passing through the rollers of the silage cutter.

Height of Ear on the Stalk.

There is no doubt about the value of field selection compared with selection in the barn in regard to this point also. Although there is a certain amount of correlation between height of stalk and height of ear, there is also sufficient exception or variation in this respect for one to make use of in selection. In tall-growing late varieties on the coast, where the stalks are sometimes 12 feet or over, the ear should not be allowed to get too high on the stalk, for this renders harvesting more difficult and induces lodging, both of which result in an increase in the cost of harvesting while the latter also diminishes the yield. On the North Coast much of the loss results in the latter case from the ravages of bandicoots, who make short work of any maize ears on the ground.

There is also a slight correlation between the height of the ear on the stalk and the time of maturity, high-borne ears generally taking longer to mature than low-borne ears.

In those districts where stalks are short, there is a danger of the ears becoming too low on the stalks, and if the crop is to be harvested with a maize binder, a large number of ears are liable to be knocked off by the machine.

The Husk.

A husk affording poor protection to the tip of the ear allows moisture to enter and causes germination or mould of the butt grains or weather discoloration of the tip grains. The germination or mould of the butt grains

is, of course, more likely to happen if the ear is erect and if wet weather supervenes when the maize is ripe. In a drier season, when the damage to the grain is not so apparent, such faulty ears may be readily avoided by selecting only those in which the husk covers the top of the ear and also fits tightly round the ear. Even where only a few of the outer bracts of the husk become loose, water is likely to lodge at their base and cause the butt grains to germinate or become mouldy.

Husks which give poor protection to the tip grains also allow the ingress of weevil and grain moth, both of which start their operations in the field.

On the other hand, large coarse husks which protrude several inches beyond the tip of the ear, are very seldom accompanied by a good ear. In such cases the ear is usually high on the stalk, the shank thick, the husk more difficult to remove, and the cost of harvesting materially increased. In very many cases where the husks are so long, the butts and tips of the ear are badly filled, being sometimes devoid of grain for some distance on the ear. As these ears are usually late as compared with the general crop, and as the butt silks emerge from the husk first, it must be that these silks are really not long enough to find their way out of the husk to catch pollen grains in order to fertilise their ovules. The absence of tip grains may be due to the same cause as the tip silks are only short, but is due also, in some cases, to the lateness of the ear and the consequent lack of available pollen, as the tip silks are the last to appear. Where the butts of the ears are filled with grain in spite of the long coarse husks, there is usually a wide space between the rows of grain at the butt, with the husk puckered into longitudinal folds which fit tightly into these spaces between each double row.

The best ears are usually accompanied by a husk which offers just sufficient protection to the tip, fits tightly over the ear, and is composed of thin, somewhat silky, bracts which render husking easy, and are generally associated with a shank of small diameter, and with an ear having a well-rounded and well-filled butt.

The Shank.

The length of the shank varies from 2 to about 10 inches, and occasionally much larger ones are found. It is usually stated that short shanked ears should be selected, but equally fine ears with long shanks have been noticed in both Leaming and Improved Yellow Dent varieties at Grafton. In the original Leaming from America, the long-shanked ears were almost a characteristic of the variety. They had been selected for this point for a large number of years, so that they would turn down at maturity and prevent rain entering the tip. These long-shanked ears are not so general in this variety as now grown at Grafton, and the maize ear-worm, which burrows into the base of the shank and causes the ear to hang down vertically alongside the stalk, was so prevalent last season that short-shanked and long-shanked ears alike were turned down in this way. It seems only reasonable to expect, however, that the longer-shanked ears would have a greater tendency to turn down at maturity, and it might be advisable to

select such ears, at any rate on the North Coast where rain is almost certain at the end of the growing period. On farms where a combined husker and sheller is used, this is even more essential, as the crop is allowed to stand longer in the field.

At the same time short-shanked ears were observed in both varieties grown at Grafton which turned down at maturity without the aid of the ear-worm, and these have usually been good heavy ears with shanks of small diameter. However, it is possible to err on the side of getting the shanks too thin, as the ears are then liable to be easily knocked off or blown off by a strong wind.

It also seems as if very short-shanked ears should not be too much striven after, for besides being very erect, such ears have been noticed to push out their silks from the top of the husk right in the axils of the leaves (*i.e.*, at the junction of the base of the leaf and the sheath). It is here that a quantity of pollen has collected from the tassel of the same stalk, being washed down into this position by rain. In such cases a certain amount of self-pollination is caused, and this, as is well known, is deleterious to the vigour of the progeny. In medium or long-shanked ears the top of the husk is well above the leaf axil, and out of the way of this pollen before the silks appear, so that the latter stand a greater chance of pollination from other tassels, and consequently the vigour is maintained.

At the same time it must be borne in mind that some strains stand self-fertilisation, or inbreeding, much better than others, just as there is a vast difference in the vigour of the progeny of different combinations of distinct strains or varieties.

In addition to the length of shank its thickness or diameter should be observed. A thick shank, in most cases, gives a flattened butt and a large core in the ear, while a thin shank is usually accompanied by a well-rounded butt and a small core. It must also be remembered that a thick shank is more difficult to break across, and, therefore, increases the cost of harvesting and husking.

Erectness of Ear.

This is intimately related to length and thickness of shank, as already mentioned.

Thickness of Stalk.

This is, to some extent, an indication of the vigour when growing under normal conditions, but may be modified largely by the closeness of planting. Improved Yellow Dent when grown under normal conditions for grain has a rather thick stalk, but by planting more thickly for green fodder the stalks become very much thinner and much more suitable for feeding purposes.

There are, however, individual differences in the thickness of the stalk under normal conditions of growth. The best ears are usually borne on a stalk which is thick at the base, and which gradually tapers to the tassel, but which should be almost cylindrical as far as the ear. Stalks which taper too appreciably up to the ear are to be avoided, as, if they do bear a good ear, the stalk is too thin below the ear and is too easily broken by a strong wind.

Some stalks are naturally thin, tall, and almost cylindrical under normal conditions. These will probably be found most suitable for selection for green fodder, as they are seldom found to produce an ear of any value for grain if they start with a very thin base.

Weakness of Stalk and Lodging.

This is another point which has perforce to be wholly neglected in barn selection. There is more value in selection to improve maize in this regard than is usually admitted. It is commonly thought that given a sodden ground and a high wind it is only a matter of luck that a stalk stands up while others go down.

In the first place, the weakness of stalks is strongly hereditary, and if no attention is paid in selection to avoid such stalks, considerable loss is likely to be caused by plants breaking or lodging, particularly during the gales of late autumn and early winter. Distinct evidence was afforded of this in the ear-to-row tests at Grafton last season, after some violent weather, accompanied by rain, in June.

Two rows quite close to one another, whose exposure or shelter, as the case may be, could not be considered to be any different, as they were flanked by other rows on both sides, showed a great contrast between the inherent qualities of the two ears in this respect. In one row, of which about 20 per cent. of the stalks were broken or lodged even before the storm referred to, a count made of the number of such stalks after the storm revealed about 90 per cent. The other row lost no stalks in this way before, and only about 5 per cent. during, the storm.

These rows were then further investigated for the apparent reason, if any, for the difference between the two rows and between the stalks which were broken or lodged and those which were still standing. At the same time the following conclusions were corroborated from inspection of a field crop which suffered from the same cause:—

(1) Most of the plants in the weak-stalked row were not laid right down (*i.e.*, lodged) before the storm, but were broken just above one of the nodes below the ear. Examination of these stalks did not reveal a high average position of the ear from the ground, but in nearly every case the stalks tapered more sensibly from the base to the ear than those which were still standing This showed that it did not require wind with the force of a gale to break such weak stalks. It must be concluded that these plants possessed just inherent weakness of stalk, and that this can be controlled by field selection but not by barn selection.

(2) After the storm an examination showed that many more were broken and also many lodged without breaking. In the former case the greater tapering of stalk was again apparent in the broken plants. In the latter case the roots were looked to as the probable source of the trouble, and it was found that the roots of lodged plants as compared with those of unlodged plants were in greater quantity, nearer the surface, and that they were quite soft and papery, while the latter were firm and fibrous.

(3) Many of the lodged plants had one or two ears very high on the stalk, thereby giving a greater leverage to the force exerted on the roots.

(4) A number of the lodged plants were in hills where two or more stalks were growing either as a result of two or more grains being sown together, or as a result of abundant suckering. More resistance to the force of the wind is offered in both these cases, and consequently the roots are subjected to greater strain.

(5) Many of the plants still standing possessed adventitious or aerial roots at the lower nodes, which on reaching the ground send out long tap-like roots which run out radially from the stalk. Such roots appeared to be of great value in resisting lodging.

Foliage.

It is seldom that a good ear will be found on a plant with scanty foliage, but, at the same time, the most leafy stalks bear some of the poorest ears, especially if the growing season has not been particularly good during the latter part. Very abundant foliage is never associated with drought resistance and early maturity. At Grafton last season some of the best ears were found on stalks with wide, though not always very abundant foliage. In selection for green fodder, abundant foliage is one of the most desirable characters.

Adaptability to Soil and Climate.

It is well known that maize of all crops must be adapted to the soil and climate before good yields can be expected The best crops will never be obtained from early varieties on the North Coast, or late varieties on the Tablelands. Further, the performance of a variety can never be judged by its first showing in a new place. And much as the variation is between acclimatised and non-acclimatised varieties, there is just as much variation in adaptability between individual plants of the same variety where proper methods of selection have not been carried out. Not to employ any method of selection in maize would be similar to crossing two varieties of wheat and expecting to get the best results from such a cross by continuing to plant the progeny year after year without any field selection. Mendelian pairs of characters in maize are segregating and recombining, even more so than in a crossbred wheat, owing to the cross-fertilisable nature of the maize plant; and one has infinitely more chance of getting the best possible combination of characters and of keeping this combination if proper selection is practised.

While the crop is adapting itself to different conditions of soil and climate there is probably more shuffling of Mendelian characters in the way of mutations than at any other time, and this is the best time for selection to begin. And it may be said that few of our varieties have passed completely through this stage of adaptability, for if this were the case there would not be such variation between ears of the same variety, and their inherent characters as seen in ear-to-row tests as there exists at present. This variation may be accounted for partly by the comparative "newness" of the varieties, partly by a certain amount of intercrossing which has taken place between varieties grown in proximity, and partly by the lack of systematic selection.

But it is not yet too late. Our varieties have been improved to a certain degree by natural selection or adaptation and by barn selection, but there is still room for considerable improvement by selection in the field.

At present maize-growing on the coast is practically confined to the rich alluvial and volcanic soils, but the varieties grown here come down with a considerable bump in yield and vigour when grown on poorer soils. In selection then, regard must be paid to the fertility of the soil to be cropped, and all the selections of seed should be made, if possible, from land of similar fertility. If the former soil is much poorer than the latter, one can only select largely on chance, but one point at any rate can be observed, that is the elimination of large ears, such as are usually grown on rich soil with abundant moisture, and which have a long period of maturity. Generally speaking, the poorer the soil the earlier should be the variety and the smaller the ears used. Large fleshy ears planted on poor soil will tend to produce the same large growth of stalk as the parent, and the ears and grain of the progeny suffer greatly in consequence, only a very poor ear being produced. Much can be done to make the conditions more equal by manuring, but the limiting factor is usually the supply of moisture. But here again, the application of "dry farming methods" will make all the difference between success and failure, just as it does with wheat in the far western portion of the wheat belt.

If, on the other hand, the soil to be cropped is much more fertile than that from which the selected ears have been taken, these will show their lack of adaptability by tending to retain the smaller stalks and ears which characterised the growth on the poorer soil

Again, the climate from which the selected seed comes should be similar to that in which it is proposed to grow it, otherwise one is allowing his yield to suffer for one or two years until the plants have become adapted to the new conditions.

By selection of one's own seed maize from the field, lack of adaptability to soil and climate is very easily eliminated when the right variety has been chosen, and as mentioned before, the yield is very intimately bound up with this adaptability.

Maturity.

By field selection one may also shorten or lengthen the growing period or bring the two extremes closer together, making a more uniformly ripening crop if desired. It is better to alter the growing period as desired rather than to put back or forward the time of planting, for this may not always be possible or advisable. The longer the growing period can be made, the greater will be the likelihood of increased yield. On the other hand, the period of maturity of a variety may require to be brought forward so as to enable the grain to ripen before the first autumn frosts.

Uniformity.

This can be best determined in the field where all the characteristics can be readily seen. There is no danger of our varieties becoming too uniform to impair the vigour for some considerable time yet, and they should

certainly be more uniform than they are at present. The existing varieties are not sufficiently clearly defined, and they have too greatly varying a reputation. If they were made more uniform and tested in different localities and on different soils, more satisfactory advice could be given concerning the best varieties for particular soils and climates. If more uniformity could be attained in field characteristics alone, the varieties would be more clearly defined as to their agronomic value, and each variety will be better appreciated by the grower, who will know more definitely what to expect and what not to expect of it.

Fungus Diseases.

It is not likely that any cob affected with a serious fungus disease would be selected, and such a selection should be studiously guarded against.

It may happen, however, that for some reason it is desired to select maize from a cob that shows some kind of damage on a small portion only. We had, for example, at Grafton, some maize cobs that were damaged by the maize-cob worm boring through the husk when the grain was in the milk stage. Some of these damaged grains, on one side only, became infected with moulds, not parasitic fungi, but such moulds as may make their appearance on any decaying material. Sound undamaged grains were selected from these cobs because they were particularly wanted, and because it was known that no harmful parasite was present, but, as before observed, only perfectly healthy cobs should, whenever possible, be selected.

Insect Pests.

On the North Coast the grain weevil and the Angoumois grain moth are the most serious pests, and the value of selection lies largely in the direction of endeavouring to prevent them from starting their operations in the ripening maize in the field. Both these pests are most troublesome in early maize, but there is no doubt that a large percentage of the damage which they cause in the field before any treatment can be applied, may be avoided by looking to the husk protection. It is only reasonable to expect that ears which are insufficiently protected by the husk are a kind of invitation to the moths and weevils, of which they do not fail to take advantage.

An examination of ears free from these pests in the field in most cases revealed not only sufficient protection as far as length of husk was concerned, but also the fact that the husk closed down tightly over the tip of the ear. That the percentage of infection in the field may be diminished by selection seems also to be brought out by an observation of the ear-to-row tests. Here some rows were badly affected by weevil while others were comparatively free, and investigation showed that in most cases the husk was to blame.

There seems no reason why, if attention is given to this matter in selection, and also in the subsequent treatment of the ears and grain in storage, North Coast growers should not be able to cope more ably with these two pests, and remove something of the stigma with which North Coast maize is branded on the market.

The presence of the maize ear-worm can only be considered to be accidental so far as the individual ear is concerned, as it bores through the husk or eats its way down through the silks, irrespective of the nature of the husk. Such ears, although sometimes part of the grain is destroyed, should never be rejected for this reason alone, as even if they do not make good show ears, they are, when the injured grain is removed, quite good for seed purposes if up to the standard in other directions.

How and when to select in the Field.

The selection may be done during the ordinary process of harvesting, a small box attached to the dray or waggon being used, in which the selected ears are placed, kept separate from the bulk in the barn, and afterwards husked, and a selection made from them as in ordinary barn selection.

To avoid getting a large number of ears, several of which would be rejected at once on husking, the farmer may strip the husk down one side of the ear in the field, so as to get a general idea of its form and grain.

If, however, one wishes to alter the period of maturity of his crop by selection, it is necessary to go through the field either when the first ears or the last ears are ripening, according as it is intended to make the growing period shorter or longer.

Ears may be selected when they have reached the glazing stage, and the earliness or lateness of the individual plant may be fairly well judged by the amount of green still left in the leaves and sheaths. If one is uncertain about removing the ears from the stalks before it is thought advisable, the plants may be marked with bright cloth, or the whole stalk may be cut off at the base. These selected plants may be set up in a shock or stook in the field, and the ears allowed to mature more thoroughly.

Ear-to-row Tests.

If the farmer is enthusiastic in this work of improving his own seed, he may take a few notes on the selected ears, put them in an ear-to-row test (*i.e.*, planting the grain from each ear in a separate row), and determine the inherent yielding capacity and other hereditary characters of the individual ears.

The ear-to-row test is, par excellence, the best method of maize improvement, and is being put into operation at all Government farms where maize is grown for the supply of pure seed of high yielding capacity.

The ear-to-row test for yielding power alone will be of great value to the maize-grower who wishes to grow his own seed, for it is only by so doing that the best results can be obtained. The value of the ear-to-row test for the farmer will be explained in a later article.

Conclusion.

The object of this article is to endeavour to show some reasons why field selection should be more largely practised than is being done at present, and why it should be substituted for or carried out in addition to selection in the barn, which, by itself, may make very little progress in the improvement of the maize crop, and which in progressive maize-growing countries has already receded, or is fast receding, into the background.

Insectivorous Birds of New South Wales.

[Continued from p. 388.]

WALTER W. FROGGATT, F.L.S., Government Entomologist.

41. The Mallee Fowl or Lowan (*Lipoa ocellata*).

THIS curious bird differs in form and coloration from all the other members of the mound-nesting birds known as *Megapodes*, and is the most southern form of the group, ranging through the north-western districts of Victoria, Central South Australia, and across Western Australia almost to the coast. The popular name of Mallee Hen or Mallee Fowl well defines it, as it inhabits all the class of low scrub known as the Mallee, a country of small, dwarfed eucalypts and other shrubs. Under the protection of this it constructs its remarkable mound nest that attracted the attention of all the early travellers and naturalists. Gould gave a long and interesting account of the birds and their mounds in his "Birds of Australia," and was so interested in their curious habits that he first published his records in the *Tasmanian Journal*. Wood, in his "Homes without Hands," gives a somewhat imaginary picture of a party of blackfellows digging out the eggs. Several writers have remarked upon the survival of these birds in our fauna, when their nests were so easily found by the natives, and it has been suggested that the different tribes had some form of protection among themselves to keep the birds from extinction. Up to the time of the agricultural settlement of the mallee lands of Victoria, these birds were fairly common; and though natives are plentiful, and food supplies not too abundant, the Mallee Hens hold their own in Western Australia. Giles, in his "Australia Twice Traversed," says, speaking of the Mount Margaret district, that the eggs of the Lowan were a great adjunct to their camp fare, and records collecting seventy of these eggs in two days, in spite of the fact that wild natives were numerous, and were also digging out the eggs.

The Mallee Hen is about the size of a domestic barnyard fowl, of a uniform brownish-yellow colour, with the feathers mottled in the centre with light brown, so that the general colour harmonises with the dull red and browns of the soil of the mallee scrub. Standing erect she is a handsome bird, with well-developed wings, broad tail, and stout legs. The latter are furnished with large feet, admirably adapted for scratching out food and scraping up earth, leaves, and mould, in the formation of her large, rounded, dome-shaped nest.

The mound nest is constructed in the shelter of the scrub, and when the whole of the surrounding surface has been swept up, the nest measures about 4 feet in height and 12 feet in diameter at the base. The male and female share in the work of scraping up the damp leaf-mould and sand, and upon the completion of their task open out the centre, when the female deposits the eggs in three circles of four or five eggs each, or a total of fifteen eggs, so that there are three layers, one above the other, in this wonderful forcing bed.

The female, during the season, lays one egg, in the early morning, every third day, and covers it with sand and leaf-mould. These eggs are very

large in proportion to the size of the birds, and have very thin shells, of a pink biscuit-brown tint. As there is such a long interval between the date of the first and last egg-laying of the clutch, the young chicks come out at irregular periods; but the Mallee Hen understands her work, and before the young birds are expected, opens out the nest, to allow for the escape of the newly-hatched chicks. The baby Mallee Hens are feathered on emergence, can run and fly, and are able to hunt for their own food; but the parent birds feed close round in the scrub, and on watch, gather together the nestlings as they leave the mound into a family party.

The Mallee Hens are insectivorous, and find their food on the ground, so that they must do a great deal in keeping down all kinds of ground insects inhabiting this open forest country.

42. The Brush Turkey or Wattled Talegallus

(*Talegallus* (*Catheturus*) *lathami*).

While the former species of megapode bears a striking resemblance to a domestic fowl, this one is not unlike a small turkey, with its bare head, yellow and blue wattles, stiff wing and tail feathers, and stout legs. When, however, the first specimens were sent to Europe, it was described by Latham as the "New Holland Vulture," under the impression that it was allied to the Turkey Buzzard or Carrion Vulture of America and the West Indies.

While the Mallee Hen ranges through the thick scrubs of the interior, this bird occupies the more semi-tropical forests along the eastern coastal mountains, and in the early days of settlement was an inhabitant of the Illawarra brushes; and though still found in our northern scrubs, is more common in Queensland, right up into Cape York and round to the north coast.

In this case the male scrub turkey does all the building of the mound nest, which is chiefly composed of earth mould and dead leaves scraped up into a conical mound about 2½ to 4 feet in height, and 12 feet in diameter at the base.

When the male bird has finished the building up of the fresh mound, often constructed on the site of last year's nest, the female comes round to lay, scratching a hole in the summit of the mound about a foot in depth, into which she crawls to lay her egg. As soon as the egg is laid, and often before, the male bird appears, and drives the female away, afterwards fixing the egg in an upright position, filling up the hole, trampling down the leaves and mould, and smoothing down the surface in a most business-like manner. From twelve to fifteen large, white, fragile, granulated eggs are placed in an irregular pattern at a depth of about a foot, in the top of the mound, and when the chick bursts its shell it soon scratches its way up to the surface (without any outside assistance from the parent birds), an active little creature, quite able to look after itself.

Sometimes the one mound may be used by two or three pairs of scrub turkeys, when it may contain as many as thirty-five eggs in all stages of incubation.

Like the Mallee Hen, these birds, from their scratching habits, find many ground insects, snails and slugs, and a bird of the size of a small turkey can account for a great number of insects every day.

INSECTIVOROUS BIRDS OF NEW SOUTH WALES.

"THE MALLEE FOWL, OR LOWAN."

Lipoa ocellata.

Approximately one-quarter natural size

Approximately one-quarter natural size.

Insectivorous Birds of New South Wales.

"THE BRUSH TURKEY, OR WATTLED TALEGALLUS."

Talegallus (Catheturus) lathami.

The Value of Herd-testing.

Recognition by the Tweed River Agricultural Society.

[Continued from page 619.]

III.

L. T. MACINNES, Dairy Instructor.

The Third Prize Herd.

MR. L. J. O. SMITH, the owner of this herd, has already won recognition in another direction. In the Egg-laying Competition, carried out at the Grafton Experiment Farm the year before last, the winning pen of White Leghorns was bred and owned by him. Most men are content with obtaining distinction in one walk of life. To few breeders, if any, has it been given to excel in two lines so far apart from each other as dairy cows and poultry.

The lessons learned in breeding up a prolific flock of fowls were thought by him to be applicable to the building up of a high-yielding herd of cows.

In breeding poultry Mr. Smith went in for "trap" nests. Each hen's productiveness was noted carefully—and he bred only from the largest egg-producers—the rest were culled out.

Long before a Herd-testing Association was formed up in his district he had bought himself a Babcock machine and commenced to test the whole of his herd, systematically putting into practice the same principles he had found so successful on his poultry run. As soon as he heard there was a chance of getting a Herd-testing Association organised in his neighbourhood he became one of its most active promoters and supporters. He told the writer that, although he had obtained good results from his own private testing, he was well aware he could not do the work as cheaply and effectively as an association; he also remarked that when it came to disposing of his stock his own tests were of little value as compared with the official ones obtained under the system organised on the North Coast.

When he sold his whole herd as a going concern last March, at what was then a record price, he stated that this was because he was able to produce the official records for each cow, showing what each had individually yielded in milk and butter during the preceding twelve months. Such records speak for themselves.

At the very time this herd changed hands another, whose owner was a noted successful show-ring exhibitor residing on the Tweed, was sold by auction. The average price received for the herd that could show the test records for twelve months of each individual milker was £3 per head more than that obtained for the herd that contained the show-ring prize winners and their progeny.

Once more it was a case of Performance gaining the victory over Appearance and Blue Ribbons.

Mr. Smith has left the North Coast to reside near Sydney. He still intends to continue the testing method, though now he is concentrating on poultry farming for egg production, and instead of the Babcock machine will rely on the trap-nest. On account of his departure the farming methods employed by him cannot be described in detail—neither is the exact acreage of the farm he leased, the rent paid, the total number of stock carried, or the cost in labour known.

From general observations of the place, however, I would not class it in with the properties of Messrs. Young and Dudgeon. It is mostly hilly country and very steep—there is only a minor portion that could be ploughed and, that great desideratum in a dry season, a fine stream of clear fresh water, is lacking. Taking it all round, Mr. Smith's natural advantages were much below those of the first and second prize winners. For his herd to come out so well shows how his consistent culling out on the test results during the preceding five or six years stood to him. Getting rid of the low-producers and filling their places with heifers bred only from the best, when carried out consistently over even a few years, always tells a tale of progress.

Mr. Smith candidly admits that it was the Babcock tester plus system that made his herd what it was, and gave him the honor of getting third place in such a big competition. He further stated that if he could only have grown more fodder crops—sufficient to have fed his herd over the whole of such a trying season—his cows would have come out far better. Be that as it may, under the existing conditions he has achieved something to be proud of.

The Herd.

The individual records for this herd are available for the whole twelve months ending 28th February, 1914. By dissecting the returns covering the longer period a more accurate idea can be given of the individual and average merit of these cows than by confining the comparisons to the six months covered by the competition, the average returns from which have already been given. The records were kept of fifty cows (the whole herd) during the twelve months, though never more than forty-five were milked at the one time, there being always some dry ones due to calve.

The following are the individual yields of these fifty, worked out on a cash basis, calculating the average price of butter at 10d. per lb. and skim milk (pig feed) at 1d. per gallon.

Cow's No.	Cash Return.	Months in Milk.	Cow's No.	Cash Return.	Months in Milk.	Cow's No.	Cash Return.	Months in Milk.	Cow's No.	Cash Return.	Months in Milk.	Cow's No.	Cash Return.	Months in Milk.
	£ s. d.			£ s. d.			£ s. d.			£ s. d.			£ s. d.	
1	18 16 5	10	11	13 13 3	8	21	12 7 2	9	31	10 12 8	9	41	8 3 7	5
2	17 16 9	10	12	13 12 0	10	22	12 5 11	10	32	10 11 5	9	42	7 17 9	7
3 .	17 16 4	9	13	13 0 6	10	23	12 5 7	9	33	10 8 7	7	43	7 15 8	6
4 . ..	17 16 3	12	14	12 18 6	9	24	12 4 11	9	34	10 6 5	8	44	7 6 3	4
5 ..	17 10 1	11	15	12 17 2	9	25	11 16 3	9	35	10 6 0	8	45	7 2 9	5
6 .. .	16 14 11	9	16	12 13 10	8	26	11 10 5	8	36	10 3 1	9	46	6 12 9	4
7	15 16 5	10	17	12 12 3	10	27	11 8 9	8	37	10 2 5	7	47	5 17 4	5
8 .	14 16 2	10	18	12 10 11	9	28	11 6 11	9	38	10 0 5	9	48	5 8 3	4
9 .. .	14 15 8	12	19	12 8 10	8	29	11 0 7	9	39	8 15 0	6	49	4 8 0	4
10 ..	14 14 4	9	20	12 7 5	8	30	10 13 4	9	40	8 10 11	5	50	4 3 0	3
Averages .	16 13 4	10·2	..	12 17 5½	8·9	.	11 14 7	8·9	..	11 19 8	7·7	..	6 9 6½	4·7

Nos. 39, 40, 41, 44, 45, 46, 47, 48, 49 were all on their first calves, beginning to milk during the last four or five months of the period. No. 50, the lowest yielder of all, was killed three onths after the commencement of testing. No. 42 slipped her calf, and was killed after milking seven months.

Deducting these eleven, there is found only one out of the remainder that yielded below £10—the average being for these thirty-nine £12 16s. 10d., and the average lactation period nine months. Deducting the one cow (No. 50) that was killed after the third test, and those heifers that came into milk for the first time during the last four months, the averages for the remaining forty-five was £12 4s. 2d., with an average lactation period of eight and a half months.

Taking the herd as a whole without making any exceptions, the average return over the twelve months works out at £11 10s. 9½d., over an average lactation period of eight months. A further analysis shows:—

2	per cent.	yielded from	£18	to	£19.
8	,,	,,	17	,,	18.
2	,,	,,	16	,,	17.
2	,,	,,	15	,,	16
6	,,	,,	14	,,	15.
6	,,	,,	13	,,	14.
22	,,	,,	12	,,	13.

Thus 48 per cent. returned over £12 each.

10	,,	yielded from	£11	to	£12.
18	,,	,,	10	,,	11.

This shows 76 per cent. returning over £10 per head. Of the balance, amongst which are included nine on their first calf and two killed before completing their full lactation period:—

6	per cent.	yielded from	£8	to	£9.
8	,,	,,	7	,,	8.
2	,,	,,	6	,,	7.
4	,,	,,	5	,,	6.
4	,,	,,	4	,,	5.

This is an ordinary grade herd, built up in the course of a few years by judicious and systematic testing, by rigorously applying the knowledge obtained by this means to cull out the non-payers, and by breeding only from the profit-makers to fill the vacant places.

What Mr. Smith has done every dairy farmer should be able to accomplish by the same means, which are placed to his hand through the agency of the herd-testing associations. How many farmers on the Richmond and Tweed —on far better farms—can demonstrate that the whole of the cows milked in their yards during the year 1913 averaged £11 10s. 9½d. in spite of the extremely dry spring and summer and the very wet cold winter.

The lesson to be learned is very plain. Unless the farm is managed as business, the yield of every cow recorded, the low producers eliminated, and nly the big yielders and their progeny kept, the natural advantages of good ertile land, large rainfall and magnificent fresh water streams will not give the same results in increasing the average return per cow and per acre with rapidity and certainty.

POISONING PARROTS IN ORCHARDS.

MR. P SOMMERLAD, of Spring Valley, Tenterfield, has adopted a method of poisoning parrots in orchards, which is very similar to that of Mr. J. H. Grunsell, of Mulwaree Gardens, Goulburn, in dealing with flying foxes (referred to on page 551 of the June issue of the *Gazette*). In many parts of the New England district the so-called "Blue-mountain" parrot has been a pest for years past. Scarecrows and mechanical devices soon lose their effectiveness, as the birds become accustomed to them. Shooting has proved inadequate and costly, and poisoning is the only method which has given uniformly successful results.

The method has been described as follows —

Use is made of the fact that the birds are essentially gregarious in their habits, and invariably confine their operations to certain picked trees of a variety of apple or pear that suits their taste. As the parrots in question are by nature honey-suckers, and are therefore fitted with a tongue adapted for extracting the sweetness out of fruit or flower, they may be relied upon to select a sweet apple, and upon such a tree or row of trees they will concentrate in hundreds, and, if left undisturbed, will eat the crop out to a finish.

One or more of the best of such trees—preferably in different parts of the orchard—are selected, whether sound or partly eaten. All the apples are picked. A good number—say, half a case—of attractive, firm, juicy apples are then taken, and, with a packing needle, a string is run through them individually from stem to calyx, leaving a couple of inches protruding at either end. With a penknife an incision is made in the side of the fruit (more than one if the fruit be large), inserting the blade almost to the core, and giving it a turn so as to take out a "plug" a little less than half an inch across. Into the hole thus made, a small quantity of powdered strychnine is placed, about as much as will stay on the point of the knife-blade (A reversed pen-nib will be found to meet the case) The "plug" is reinserted, and the apples are allowed to stand at least twelve hours, by which time the peculiarly solvent juice of the apple has dissolved the strychnine and distributed it throughout the fruit

To hang the bait in the chosen tree is the next step For this purpose, nothing is found to answer better than a bough from a bush tree, such as a stringybark, which is then mounted on a pole so as to be well above the foliage of the apple tree This is preferable to hanging the fruit on the tree itself, inasmuch as parrots invariably alight on the topmost part of the tree and work downwards The boughs are also portable, and should the parrots shift their quarters to another part of the orchard, can easily be removed to the spot. The best plan is to place a number of boughs in different parts of the orchard. It is scarcely necessary to say that every care must be taken to warn persons going into the orchard. Poultry should also be kept at a distance, though little fruit falls from the boughs, on account of its being tied on. All that is now necessary is a couple of decoy birds in a cage in the tree, and the parrots can be left to their own devices.

The poison is exceedingly quick in action, and within ten minutes or so from the time they commence to eat, the birds will begin to drop. Many fly away as soon as poison pangs seize them, and may be found in all parts of the orchard, as well as the bush around, and in neighbouring orchards. Poisoned birds have been picked up in orchards 5 miles and more away. This fact makes it impossible to compute definitely the extent of the destruction, but enough evidence can be gathered from known results to show that that method is exceedingly effective. As the poisoned fruit is eaten, more is put up, and the work may be continued almost indefinitely while the birds continue to give trouble During the past season Mr. Sommerlad used poison on twenty days, and the number of dead birds picked up was 2,371. It should also be stated that Mr. Sommerlad runs pigs in his orchards to eat up windfall fruit, and that the pigs have a marked partiality for the poisoned parrots. No harm follows their eating them, but it is necessary to exclude the pigs while poisoning if a reasonably correct record is to be kept. The biggest total for one day was 430 dead birds.

The Colouring of Margarine.

HOW IT AFFECTS THE DAIRYING INDUSTRY.

M. A. O'CALLAGHAN.*

THE Margarine-Butter conflict in Australia narrows itself down to a question of colour.

Margarine makers claim that they should be allowed to present that substance in the most alluring manner to consumers, and have decided that a light bright-yellow colour is a necessary factor. Hence they ask that the law should permit them to use yellow colouring matter in the manufacture of margarine. Let us examine the foundations on which this claim is based.

They claim as follows:—

(1) That margarine is a wholesome and nutritious article of diet, and is equal in value to butter as a food.

(2) That as butter is allowed to be coloured there should be no objection to the colouring of margarine.

(3) That as colouring matter is allowed in margarine sold in England, a similar law should prevail in Australia.

(4) That it is a valuable substitute for butter, and, being much cheaper, nothing should be put in the way of the poorer classes using it.

(5) That best margarine is preferable to inferior butter, and hence there should be no protection for the inferior article.

(6) That as a conference of officials representing the various States agreed to recommending that colouring matter be allowed in margarine, the Governments of Australia ought to adopt the recommendation.

The Equality of Margarine with Butter.

Regarding the first claim of margarine manufacturers, no one will deny that margarine made from the very best fats (namely, what is known as *premier jus* of beef fat, and the best nut oils) is a wholesome and nutritious article of diet, but whereas the very best beef fat as mentioned is treated while in a fresh state and is handled so that the finest quality will be turned out, still all the second-class animal fats are not so treated, and before margarine manufacturers can claim that margarine in general can be compared with butter as an article of diet, the same supervision of the handling of animal fats and their treatment should exist that now exists with regard to the production of milk and cream for butter-making.

It will no doubt be stated that, no matter how inferior the conditions are under which animal fat is collected for margarine purposes, owing to

* Paper read at the Dairy Factory Managers' Conference, July, 1914.

the heating which the fat gets in order to purify it any germs of putrefaction that may have had access to the product are destroyed. But it must be borne in mind that, whereas the heat destroyed the germs that go to form toxic products, still *if toxic products are formed before the application of the heat, these poisonous substances are not destroyed by the action of heat,* hence the necessity for seeing that no decomposed animal fats are allowed to be used in the manufacture of margarine, and for a careful supervision of the industry at every stage.

The dairy industry has to stand the closest inspection, and competitive industries should be similarly treated.

Now, as regards the claim, or statement, that margarine is equal in value to butter as a food. Of course, in making this statement, the margarine manufacturers refer only to their highest quality, and here in itself is a considerable deception, because, unlike butter, margarine can be turned out according to the will of the manufacturer, containing any percentage of inferior oils that he deems necessary in order to turn out an article at a given price; but we will examine the statement on the lines of comparison between best margarine and normal butter.

There seems to be an idea that provided a food can be obtained showing the percentage of fat equal to the amount of butter-fat in butter, that the food should be as nutritious as butter. An inquiry into the subject must throw grave doubts as to the truth of the statement that animal-body fats or vegetable fats are equal in nutrition to butter-fat. In the first place, there is no other fat known to man which has the same chemical composition as butter-fat. Butter-fat contains a higher percentage of volatile oils than any other animal fat or vegetable fat, and it also differs from all other fats in so far as it contains about 7 per cent. of butyrin, a glyceride peculiar to butter-fat.

In support of the statement that the quality of the article is affected by the percentage of volatile fatty acids, Violette's analysis shows that butters of superior quality contain more butyrin than butters of inferior quality, though 5 per cent. butyrin was the lowest which his analysis showed.

What then will we say of the quality of a substitute which contains no butyrin, and is also deficient in the glycerides of other volatile fatty acids?

Looking at the question from the point of view of the ordinary observer, it would be contrary to our experience of Nature's teaching if ordinary animal and vegetable fats were equally nutritious as butter-fat. Nature provided that children and other young mammals should obtain the necessary fat in their food from milk, and all other fats followed only as an aid to the food of the very young. The young of the bovine species under natural conditions obtain butter-fat through the milk of the mother, until they are about a year old. This would go to show that butter-fat at least was more nutritious to the young mammal and in a more suitable condition for the development of the animal than the vegetable fats obtainable from grass and other edible plants.

Now if Nature made this selection, and if it is also shown that butter-fat stands alone in its chemical composition, surely we ought to accept the

teaching that milk-fat, for the young at least, is more suitable and more nutritious than is any other fat. If we admit that it is more suitable for the immature organism, we must also admit that it is more nutritious and more suitable for all that are not in vigorous health. We must undoubtedly conclude also that it is more suitable for the huge numbers of people that lead sedentary lives in crowded cities, because not one of them leads the natural healthy life common to out-door and country occupations.

This reduces the number of people who are in a position to extract the necessary fat nutrition from good margarine to the vigorous, robust, out-of-door worker, whose health is of the very best. In fact, he is in such good condition, so to speak, that it does not matter very much, within reason, what food he consumes.

Lewin, of the British Government Laboratory, a man whose opinion from experience I am prone to follow, considers that butter or butter substitutes showing a low percentage of volatile fatty acids are necessarily inferior; and we have as a recent addition to the evidence on this point the interesting experiments carried out by Dr. E. V. McCollum, at the Winsconsin University, in the feeding of rats on different foods, and the supplying of the fat of these foods from different sources. It was found during the work of this nutrition experiment that when the fat was supplied from other sources than butter-fat, the rats grew in a normal way for three or four months, and then, though they kept in good condition, ceased to grow further. They remained without showing further growth for many weeks and until butter-fat was substituted for lard in the food, when the rats resumed their growth, and the same satisfactory result was found when the fat extracted from the yolks of eggs was used. Here Nature's teachings are very strongly borne out. The egg is the seat of nourishment for the young bird, and milk is the seat of nourishment for the young mammal.

These experiments are sure to cause further investigation, and for the present at least the wisdom of using butter substitutes for butter in the diet of most human beings must be doubted.

If Colouring is allowed in Butter, why not in Margarine?

Regarding claim No. 2, it is difficult to imagine on what grounds the advocates of margarine base their claim. The fat present in cow's milk is associated with a natural colouring matter, and, except in extreme cases when the food of cows is abnormal, the butter obtained from the milk of the cow is of a light yellow colour. On the other hand, coco-nut fat, which is at present being "boomed" as presenting one of the main constituents of margarine in the future, is in its natural state of a pure white colour, and the whiter the fat the better the quality. The Minister for Health, the Hon. F. Flowers, M.L.C., when replying to a deputation recently, put his finger on the kernel of this subject when he asked if the addition of colouring matter to margarine rendered it more nutritious. There are a number of other colours, besides the natural colouring of butter, all of which are open to margarine manufacturers to adopt. If margarine is a

food sufficiently good that it can stand on its own basis, why not adopt a distinctive colouring therefor, such as pink?

There can be but one object behind the agitation to have colouring matter allowed in margarine, and that is so that the false article may be substituted for the real.

We may also state that New South Wales butter wants no added colouring matter.

If allowed in England, why not in Australia?

We will now consider claim No. 3, because the fact that colouring matter is allowed in margarine sold in England is constantly being used as an argument in favour of colouring matter being allowed to be used in margarine sold in New South Wales or in Australia generally.

In order to deal with this matter it will be necessary to refer somewhat to the history of margarine and its sale in England.

It is known that England, with its dense population, is unable to produce sufficient butter for its own requirements, and, owing to the high price which butter brings in England as well as the large quantity required for use there, every dairy country in the world sends at least a portion of its surplus butter for sale to England. The consumption of butter per head increased enormously when, through the aid of the centrifugal separator and the adoption of modern methods, it was possible to produce a butter of good quality throughout the entire year. This demand was utilised by unscrupulous butter dealers to supply an article which was not pure; and high percentages of foreign fats were mixed with some of the butters that were exported to England from some European countries. Holland acquired the best reputation in this line, and for some years the English consumers were using, as pure butter, an article which contained a fairly high percentage of what is now known as margarine. Later on it became legal to sell any mixture of margarine and butter as margarine. Thus colouring matter was introduced into margarine by the aid of added butter. As soon as the chemists responsible for the detection of butter adulteration got to work on the subject, it was shown that, whereas it was possible to detect large percentages of foreign fats in butter, it was not possible to detect, with full certainty, the addition of foreign fats, even to the extent of 30 per cent. As a consequence a special Margarine Act was passed in England, which limits the percentage of butter-fat allowable in margarine to 10 per cent. This means that the colouring matter present in 10 lb. of butter is not sufficient to colour the other 90 lb. to such an extent as to enable the mixture or blend to present the colour of butter. Prior to the passing of this Act, however, it was legal to sell margarine and butter mixtures of various percentages, and consequently the British public were allowed to use good brands of margarine for many years in the shape of butter and margarine mixtures; and having been allowed to use this blended coloured article for so long, the question of depriving it of colouring matter was a very difficult one, especially in view of the fact that it was not possible for England to import sufficient pure butter to meet all its requirements.

We all know that the position in Australia is on an entirely different basis. Not only do we produce sufficient butter to meet our own requirements, but we export a large surplus. In addition, people here have not been encouraged, nor even allowed, to use margarine and butter mixtures as a substitute for butter; and consequently it is not proposed to withdraw from them any concessions which have been allowed in the past.

In England large quantities of capital were invested for the purpose of producing margarine to meet the public demand for margarine mixtures containing large percentages of butter-fat, which were then quite legal, and it would have been an undoubted hardship on the people who subscribed that capital to meet a want in the British food supply if, after many years, the law was so altered that the capital invested would have been materially depreciated in value. Those who set out to manufacture margarine in New South Wales know the conditions under which its manufacture and sale are allowed, and if they put capital into the industry they do so with their eyes open, and with a full knowledge of the fact that colouring matter has never been allowed in margarine here, and that indications are that it never will be allowed therein. Hence, vested interests should not be jeopardised in any way by the disallowance of colouring matter in margarine manufactured or sold in New South Wales.

Though we are a part of the British Dominions, a law which may be useful and necessary in England may not apply here; and at this stage it may be interesting to see what the other great section of the English-speaking portion of the Empire, namely, Canada, is doing regarding this matter.

Canada not only disallows colouring matter, but it actually prohibits both the manufacture of margarine there and the importation of margarine into that country. Canada realises that its dairying industry is a national one; an industry which is necessary to the welfare and development of the nation; and it does not intend to take any risks by allowing that industry to be unduly interfered with. The manufacture of margarine may give a cheaper fat food to the Canadian, but the few people employed in the necessary factories would not help materially to develop or defend that country.

Even the United States of America, with its huge population to be fed, puts a tax of 10 cents per lb. on all coloured margarine manufactured there, whereas on uncoloured margarine the tax is only ¼ of a cent per lb. In addition there is a duty of 2½ cents per lb. on all margarine imported into the United States of America, and a further charge of 15 cents per lb. as a revenue tax. This makes the views of Americans stand out very clearly regarding the colouring of margarine.

France, another country with a dense population, prevents the manufacture of coloured margarine; whilst Denmark, though its inhabitants consume a large amount of margarine, restricts the colouring of margarine so that it may not resemble butter, and in addition controls its sale in a very complete way. They also prevent the export of margarine from their country.

Margarine is a necessary article of diet in England with the poorer classes, for the simple reason that the world does not produce enough butter to send a sufficiently large surplus to England to meet the requirements of that country for an edible fat.

If the same rate of wages was payable in connection with the growing and harvesting of nuts for margarine purposes as is payable in connection with the production of butter, the butter producer would not have much to fear from the margarine manufacturer; but when the dairying industry, which is carried on by white labour, is asked to compete with the nut-oil industry, carried on by black labour, there is no gainsaying the fact that the dairying industry must suffer by comparison, in the question of prices.

Margarine as a Food for the Poorer Classes.

Regarding claim No. 4, namely, that as margarine is a valuable food nothing should be put in the way of the poorer classes using it as a substitute for butter, so far the only bar which New South Wales has put is to prevent margarine being coloured to imitate butter. We use white sugar and white bread in preference to brown sugar and brown bread, and it is difficult to see what objection there can be to the use of a white butter substitute. We are aiming at a White Australia, and it would certainly be a bad way to aid that movement by sending our money abroad to countries where coloured labour may be had for a song, to purchase nut-oils to take the place of the butter produced by white labour in our own country. Apart from this, the rural worker in New South Wales receives at the present time as much as about £2 per week, and therefore cannot possibly be compared with the worker in England who gets less than half that amount. The working people in this country are paid good wages, but if the value of our primary products is to be reduced by competition with cheaper products, obtainable from other countries where labour costs only a fraction of what it does here, then undoubtedly wages must depreciate in Australia.

Good Margarine *v.* Inferior Butter.

On claim No. 5, the best margarine is preferable to inferior butter, and hence there should be no protection for the inferior article, rests the only argument of any value which the margarine manufacturer is able to put forth. People speaking nowadays talk of margarine as though it were all of a uniform quality, whereas the grades of margarine are more varying than the grades of butter. The very best margarine, made from a mixture of sound animal fats and nut-oils, containing about 10 per cent. of butter-fat, is undoubtedly a very palatable food and a nutritious one, but there are some very low grades of margarine which I would not eat as a butter substitute, and which I would not even use for cooking purposes. Again, margarine made solely from nut or vegetable oils is not nearly so palatable as the margarine which contains a mixture of the best animal fats, nut-oils, and butter-fat, as referred to above; so that if the public are to be given the very best margarine the difference in price between it and butter would

not be so very great, as the wages for the actual manufacture of margarine in New South Wales would considerably increase its price compared with margarine produced in England and on the Continent. The fact remains, however, that the margarine manufacturer or advocate has struck the weak point in the butter-maker's armour when he touches on the question of inferiority, and it remains for the butter-maker to put his house in order so that there may not be the slightest justification for the statement that we are afraid of margarine because we are producing an inferior article. If it can be shown that we are asking protection for an inferior article only, then the time when a colouring matter would be allowed in margarine would not be far distant.

The Recommendation of an Inter-state Conference.

Though not much publication has been given to this particular claim, still the recommendation referred to is being used to a considerable extent privately for the purpose of pushing the general claims of margarine manufacturers.

It will be sufficient for my purpose here to state that the conference referred to did not contain a single individual directly representing the primary producers, and also that no evidence whatever was taken on the subject. The conference was called for the purpose of fixing standards, and no doubt the analyst saw no objection, from an analytical point of view, to allowing colouring matter in margarine, because, provided certain earmarking substances such as sesame oil were added, the analyst would have no difficulty in detecting pure butter from false.

General Conclusions.

The question for Australia really to consider, in my opinion, is not whether colouring matter should or should not be allowed in margarine, but whether we should take a leaf out of the book of the Canadians and prohibit the manufacture in, or import of margarine into this country.

The few people required to actually manufacture margarine would be a bad substitute for the dairy-farmer towards national development, and the dividends paid by the margarine manufacturers would not go far towards defending the country. It is agreed on by all that Australia wants an increased population, and that population must be mainly a rural one.

The question then presents itself, whether the national rural industries should not be conserved for the development and mainstay of the country. We are encouraging large numbers of people to come and to settle on the land, but if the people in power allow one of the main industries of closer settlement to be even partly undermined at this stage, it would certainly be not playing the game. It would not be fair to encourage people who did not understand the trend of affairs to invest money in land for dairy-farming, and at the same time give privileges which would enable the producers in tropical countries of coco-nut oil and palm-nut oil to build up an industry which would in time make it unprofitable for those settlers who put their money into Australian land.

It must be remembered that already one State in Australia, namely, South Australia, allows margarine to be sold containing colouring matter, and that this is being quoted as a reason why other Governments should follow suit. Now is the time to settle this question before vested interests get too strong for the dairy-farmer. The question is, would it not pay the dairy-farmers of Australia to put up enough money to buy out the margarine interests, provided the various Governments passed laws prohibiting the manufacture and sale of margarine as a table-butter substitute? There is no objection to its taking the place of dripping for "cooking" purposes.

The question has been raised as to whether, if the manufacture of margarine were prevented in Australia, the price of butter would not go too high locally. The answer to this is that the time is far distant when the population of Australia will overtake the butter production, provided the industry can be carried on without competition from substitutes produced by cheap low-grade labour. Also, it is doubtful if any country gets cheaper pure butter than does Australia. The wholesale price of first-quality butter in Sydney for the past five years has averaged 11½d. per lb., and this is certainly not a high price, comparatively speaking. Then, if it were found that the local consumption had practically approached our producing capacity, it should be a better proposition to tax the export of butter and thus keep the local price a reasonable one, rather than manufacture margarine and thus subsidise foreign labour at the expense of the development of our own country.

Table Grapes on Phylloxera-resistant Stocks at Kingswood.

Mr. A. H. Veness, of Penville, Kingswood, has forwarded to the Department photographs of Black Tokay and Thompson's Pride grapes grown on Rupestris stocks. They were 5-year old grafts and were planted 6 feet apart each way. The Black Tokay vine cut 26 lb. of grapes, while Thompson's Pride yielded about 18 or 20 lb. Mr. Veness is so satisfied with the returns that he is planting another patch this year, but is going to plant the vines 8 feet apart, as he does not believe this is too far for vines on resistant stock in the district.

Mr. Veness gives the following description of Thompson's Pride:—In colour it is a clear amber (some people have said that it looks like cream). It does not get the bronzy appearance which White Muscat and Sherry get when quite ripe. In shape the berry is somewhat like Waltham Cross, very even in size. The bunches are not quite so big as those of Waltham Cross, but it is a far better cropper. The berries hang loosely on the bunch, somewhat like Snow's Black Muscat. The flesh is firm, somewhat like Waltham Cross, and the flavour is sweet and pleasant. It stands wet better than most sorts—in fact, it was the very last grape cut this season, but could be eaten many weeks before. The crop photographed was kept to show any of the neighbours, while the bulk of the crop was cut to be marketed with the last of the other varieties, and brought top price.

A good crop of Black Tokay (26 lb.), grown on Rupestris stock. 5-year-old graft. Planted 6 feet apart each way.

Thompson's Pride. Grown on Rupestris stock. 5-year-old graft. Planted 6 feet apart each way.

Table grapes on Phylloxera-resistant stocks. Grown by Mr. A. H. Veness, Kingswood.

Notes on Date Culture in America.

WITH SOME CONSIDERATION OF ITS POSSIBILITIES IN NEW SOUTH WALES.

W. M. CARNE, Botanic Gardens.

THE growing of dates as a commercial crop in America goes back to the importation, by the Department of Agriculture, in 1876 of a number of Egyptian varieties. The success of some of these at Phœnix, Arizona, led to the securing of a number of Saharan suckers during 1899–1901. Since then many importations have been made, until there are now in Arizona and California a greater variety of date palms than may be found in any similar area of the Old World. The Algerian Government has recently been compelled to limit the number of offshoots which may be exported annually, to protect its own industry.

In the Coachella Valley of California, the largest centre of the industry, nearly 200,000 trees have been planted. Few have yet fruited, as it usually takes five or six years before suckers come into bearing.

Investigations are now sufficiently forward to determine the best varieties for different conditions. The writer during the summer of 1913 visited the principal experiment stations for dates at Phœnix, Tempe (Salt River Valley), and Yuma (Colorado River) in Arizona, and Mecca and Indio in the Coachella Valley of Arizona, and the following information was there gathered.

Types of Dates.

There are three types of dates, viz. :—

(1) Soft dates containing upwards of 60 per cent. of sugar and preserved by its presence from decay.

(2) Dates with a lower percentage of sugar, and not suitable for drying and long storage.

(3) Dry dates.

The dry dates are quite unlike any of those obtainable here. They are preferred by the Arabs as a staple food, and may be kept for years. It would be difficult to establish a demand for this crop in Australia.

The soft dates are those we usually know, and chief amongst them is the Deglet Noor. The greatest drawback to these varieties is the long hot dry summer required for their development. As will be shown later, there are probably no places in New South Wales suitable for them.

The second class are practically unknown here. They are eaten as fresh fruit, and as they will not keep as long as ordinary dates, are only suited to comparatively local markets. This group includes the earliest fruiting varieties, and promises to do better in New South Wales than the other types.

Climatic Requirements.

The date palm requires great heat, low humidity, and no rain during the six months of the fruiting season. Rain is the greatest danger. In some years upwards of 90 per cent. of the crop at Tempe has been lost by this cause. Yet there must be a plentiful supply of water always available at the roots, or the fruit will dry up.

The following table has been prepared to compare our interior country with the climate of established date areas.

Place.	Mean Annual Temperature.	Mean Annual Rainfall.
Date Areas—	Degrees Fah.	Inches.
Tozer, Tunis	71·2	4·9
Gabes, Tunis	67·4	7·5
Biskra, Algeria	67·1	6·7
Phœnix and Tempe, Arizona	69·0	7·27
Indio, California	73·9	2·76
Hergott Springs, South Australia	... ...	5·92
Localities in Western New South Wales—		
Moree	68·6	23·39
Bourke	69·2	14·86
Wentworth	64·0	12·10
Wilcannia	66·4	10·35

In Tunis and Algeria the summers are usually almost rainless. In California winter is the rainy season. At Phœnix the rain occurs throughout the year, mainly in the summer and winter. Bourke has as its rainiest month, January; Moree, February; Wilcannia, March; and Wentworth, June. Of the above established date areas Gabes, Biskra, and Phœnix, with annual mean temperatures below 70, are unable to mature the best and longest season varieties, including the most valuable of all, the Deglet Noor. In New South Wales it would, therefore, seem advisable to experiment with other varieties, particularly the fresh dates which have proven successful at Phœnix—such as the golden varieties Khadrawi, Halawi, Kustawi, and Maktum, or the dark dates the Nazl el Bacha and Birkit el Hadji. These dates sell freely in Arizona as fresh fruit at about 9d. per lb.

Artificial Ripening.

Considerable loss of fruit has been experienced at Yuma, Tempe, and Phœnix, especially amongst the later varieties, owing to lack of heat to maintain steady ripening and to untimely rain. This has been largely reduced by artificial ripening. The mature unripened dates are cut, and treated with carbon dioxide or nitrous ether vapour to ripen them. Two other methods are now under trial, and are said to work well. One is to place the fruit in an insulated room for several days. The constant heat thus maintained, day and night, hastens ripening. A quicker method is to place the fruit in a specially-constructed chamber, and subject it to a temperature of 120 degrees Fah. for about eighteen hours. In every case there is less loss from birds, and the percentage of loose and damaged fruit is

reduced. In packing high-class dessert dates, the fruit is allowed to remain attached to the twigs. Loose and second quality fruit are sold at lower rates. Slow incubation methods are in use in the Coachella Valley, and chemical methods in the Salt River Valley.

Alkali Soils.

In the irrigation areas of the Salt River, Imperial and Coachella Valleys, there is much land where ordinary crops cannot thrive, owing to the excessive amounts of alkali. Of all plants the date palm is, perhaps, the most alkali-resistant. It has been found, however, that small suckers and seedlings suffer considerably. It is therefore necessary either to grow seedlings and suckers until well grown in good soil before transplanting, or to thoroughly soak the places where the young plants will be placed to wash down the alkali.

Birds and Insects.

Insects and birds have given some trouble. The latter are checked by covering the bunches. Of the former, two scale insects are the most important. Owing to the fibrous leaf bases, spraying has not been very successful. A method now adopted is to remove the leaves, and to burn over the whole trunk with a gasoline torch. This drastic treatment seems to have no effect on the after-growth of the trees.

Supply of Suckers.

One of the great difficulties experienced is to obtain date palms of good varieties. Ordinary seedlings do not have the characters of the female parent. As a rule, one-half are male plants, and of the fruiting palms only one-tenth to one-quarter bear marketable fruit, the proportion varying mainly with the length of the summer in the districts in which they are growing. The use of suckers is the only reliable method of reproducing a variety. These are produced by the palms for the first ten or fifteen years of its life, and usually one becomes sufficiently grown to be removed each year. Off shoots in America sell at from 15s. to £3 apiece. Importations are now mainly made from Persia, as limits have been fixed in Algeria as to the number allowed to be annually exported.

Pedigreed Seed.

To overcome this shortage of reliable fruiting suckers pedigreed seed is now being raised, mainly of the Deglet Noor—a late season variety of excellent quality, without the stickiness of many soft sorts. These seeds are from good quality trees, fertilised by male palms raised from seed of good quality fruit, all of the Deglet Noor variety.

The seedlings are raised in nurseries, and planted out during the second year 5 to 6 feet apart, in rows 30 feet apart. Between the rows other crops are grown. When the palms flower the males are cut out, leaving about 1 per cent. for fertilising, taking care that the trees left flower about the same time as the females. The inferior females are also removed. In this way the rows are thinned. Refills where necessary are planted from suckers from the best fruiting varieties.

Australian Experience.

About 1895 a number of Algerian date palms were planted at Pera Bore. These were not true to name, and only one bore good fruit. Probably for climatic reasons and a lack of abundant water during the summer, Mr. Allen, the Departmental Fruit Expert, had to report that, "Many other female date palms bloom and set their fruit, but the latter dries up in place of developing properly at the time they should ripen." Isolated palms have occasionally borne good fruit in New South Wales and Queensland, but the most successful plantations have been those at Hergott Springs and Lake Harry, in South Australia. These plants were obtained from the Algerian Government about 1895, and are growing under climatic conditions which should be ideal. Fruit is regularly sold in Adelaide.

Prospects in New South Wales.

There seems little prospect for date growing under present conditions in New South Wales. Climatically all the country along and west of the Darling is suitable, especially for the fresh early kinds, but in only a very few cases is sufficient water available to water more than a few palms during the summer. In the event of irrigation works on the Darling, however, there are possibilities for a very hardy crop which, when once established, requires little attention, and will continue to bear heavy crops for over one hundred years. On account of the summer rainfall methods of artificially ripening the fruit would probably prove necessary.

Cheviot Sheep for Sale.

THE Department has for sale at the Glen Innes Experiment Farm a small flock of Cheviot sheep, comprising three rams and five ewes, from 6-tooth to full-mouth The reason for offering the sheep is in order that another breed might be more satisfactorily accommodated at the above centre.

The flock has been under observation at Glen Innes for the past four years, and anyone requiring a hardy breed for cold mountainous country will find these sheep eminently suited to these conditions.

The flock is of New Zealand origin, and the price asked is £15 15s., f.o.r. Glen Innes.

Paspalum dilatatum—How to distinguish Good Seed.

THE so-called seeds of paspalum, as in many other grasses, are simply the floral envelopes which may or may not contain seed. The higher the percentage of real seed present the greater is the bushel weight of the seed as sold. First-class seed should have a bushel weight of about 24 lb.

If it is not convenient to weigh the seed the following simple test may be used:—Take a pinch of seed and spread it on a hard surface, such as a table. Then, with a blunt knife, press gently but firmly on each seed in turn. Those containing formed seed resist the knife-blade, whilst the others are dented. By counting the number examined the percentage of formed seed may be determined. The best seed contains about 70 per cent. of formed seed, but anything over 50 per cent. is good.—W. M. CARNE, Botanic Gardens.

Banana Disease on the Clarence River.

For the past two or three years a disease has appeared in a few of the banana plantations on the Clarence. From its characteristics it is known locally as pear-top, bunch-top, blight, or rust, and is dissimilar to any defined disease known in the State.

Only a comparatively small area is devoted to banana culture on the Clarence, the largest plantation covering about 4 acres.

The question has been investigated by the Biological Branch of the Department, and so far no fungus or bacterial disease has been detected.

The disease appears to be of physiological origin, and the investigation seems to point to soil exhaustion as the cause, for the following reasons—

(1) It appears in old plantations only.

(2) Young suckers from elsewhere planted in the soil of these old plantations develop the disease.

(3) Sugar-cane on similar soil shows the development of "bunchy-top."

The remedies suggested are—

(1) Thinning out the plants.

(2) Manure.

(3) Where possible, the introduction of another crop, the cultivation of bananas over a long period of years on the same soil being discontinued.

In this connection it is of interest to point out that in all banana-growing countries it is looked upon as a very exhaustive crop, one authority stating that no other cultivated plant exhausts the soil to such an extent as bananas. The land should therefore either be very heavily manured or have a complete rest, during which its fertility may be restored.

The *Bulletin* of the Department of Agriculture, Jamaica (New Series, Vol. I, No. 4, 1911), states that "It is considered advisable to re-plant a banana-walk after an interval which varies from three to six years."

Extensive experiments in manuring bananas have been carried out in Queensland by the Department of Agriculture.

These were fully described in the *Queensland Agricultural Journal* for August, 1914. The proportions used by them in the basic formula are 40 lb. nitrogen, 80 lb. phosphoric acid, and 80 lb. potash per acre.

Mr. Guthrie has supplied the following formulæ which give these proportions as nearly as is necessary :—

(1)	3 cwt. dried blood	per acre.
	4¼ cwt. superphosphate	
	1½ cwt. sulphate of potash	

Or using sulphate of ammonia instead of blood,

(2)	2 cwt. sulphate of ammonia	per acre.
	4¼ cwt. superphosphate	
	1½ cwt. sulphate of potash	

Different quantities of these proportions might be tried.

(3) $4\frac{1}{2}$ cwt. dried blood		per acre.
$6\frac{1}{4}$ cwt. superphosphate		
$2\frac{1}{4}$ cwt. sulphate of potash		
(4) 6 cwt. dried blood		per acre.
$8\frac{1}{2}$ cwt. superphosphate		
3 cwt. sulphate of potash		

Also a larger proportion of potash might be used (to compare with 1).

(5) 3 cwt. dried blood	per acre.
$4\frac{1}{4}$ cwt. superphosphate	
3 cwt. sulphate of potash	

The conclusions arrived at by Mr. J. C. Brunnich, Chemist to the Queensland Department of Agriculture and Stock, are of undoubted value in this connection. He says:—

> The physical condition of the soil was improved by cultivation and manuring, and the soil is now (*i.e.*, after heavy manuring for four years) in excellent condition, capable of producing good crops, as the plants are enabled to utilise the fertilisers easily. The owners of the experimental plots are quite convinced of the profits derived from the application of our complete fertiliser, and are continuing its use on these and other areas under bananas
>
> As a conclusion, I am justified in stating that an application of the principles evolved from our fertiliser trials to other areas of old banana lands would lead to a considerable expansion of the industry, as it will be found that most of the old lands, all of which are in easily accessible localities, will give profitable yields.

The experience gained in Queensland, where a million bunches are produced annually, should be applicable to the banana lands in our own State, as the soil and climatic conditions are in many ways very similar.

Seed Testing for Farmers.

The Department is prepared to test vegetable and farm crop seeds. Reports will be given stating the germination capabilities of the seed, its purity, and the nature of the impurities, if any.

Communications should be addressed to the Director, Botanic Gardens, Sydney. Not less than 1 ounce of small seeds such as lucerne, or 2 ounces of large seeds like peas, should be sent. Larger quantities are to be preferred. Seeds should be accompanied by any information available as to origin, where purchased, age, &c.

If a purity report only is desired, it should be so stated, to secure a prompt reply. Germination tests take from six to twenty days, according to the seed.

Seasonable Work for Poultry-keepers.

JAMES HADLINGTON.

SEPTEMBER.

THIS is at once the busiest and most interesting time of the year on the poultry-farm. It is also the testing time for the beginner. At first the fascination of seeing large numbers of fluffy mites emerging from the shells at hatching time appears novel and interesting; but not infrequently a change comes over the scene at an early stage, and the once-promising chickens droop and show signs of giving up what has turned out a struggle for existence. Something has happened. A slight creamy to yellow discharge is noticed, and it is at once concluded that White Diarrhœa, Cholera, Enteritis, or something of the kind, has made its appearance. Attention is at once focussed upon disinfecting the brooders. It has already been read about that the microbes of the diseases mentioned are incubated with the eggs. The incubators must, therefore, be sprayed: kill these microbes and all will be well. But will it? This kind of business goes on, and chickens are hatched only to die, and the season is whittled away while speculation goes on, and the operator finishes up the season with probably a third of the number that was hatched, and even these are more or less weedy. The lesson is still unlearned; the next hatching season comes round, and the process is repeated with the comfortable conviction that the whole trouble is caused by a microbe, and all that is required is some specific to kill it.

But the real cause is scarcely ever suspected; because it is simple, many are apt to think that it ought to be something "scientific," but it is not, and that is the stumbling-block to a proper diagnosis. In most instances the chicken-raising business is entered into with the assumption that the chicken is understood, or that it is easy to acquire the necessary knowledge how to manage it, and when trouble arises, instead of this being recognised, some "scientific" explanation is sought to account for failure, and the simple, plain facts standing out before us are too often ignored or overlooked.

It should be understood that when trouble occurs it is, in nine cases out of ten, through faulty methods of rearing, and it is the purpose of these notes to point out a few of the most prominent causes of the trouble, and how to obviate them. The first is the want of definite experience. It is difficult to inculcate the difference in the methods required between handling a dozen chickens and 75 to 100 in a batch. What succeeds with the smaller number may exterminate the latter. Why? Because the habits and predilection of the chickens are not understood and met. One of the most prominent mistakes made by the beginner is to run his brooders at too low a temperature. The temperature that might succeed with a small number will be fatal to the larger batches, because of the fondness of the chicken for warmth, and its crowding to get it if not otherwise available. It is the crowding, and not the want of warmth, that is fatal.

After crowding comes the "chill," and then follows the whole train of chicken troubles. Microbes there may be; but the conditions have either

encouraged them, or induced the chicken's susceptibility to disease. Pure air is absolutely necessary in conjunction with high temperatures, or sickness will result from this cause. It therefore follows that in artificial brooding it is necessary to use brooders capable of generating plenty of heat, so that a sufficient volume of fresh air can be kept circulating through the brooder. High temperatures in the brooder will not harm the chickens if they can get away from it, and a brooder is imperfectly constructed if this is not allowed for. As has been previously pointed out, bad brooding arrangements are responsible for most of the troubles in rearing. Failure to thin out and give more room as the chickens grow, is still another phase of the same conditions. A brooder that will accommodate 100 day-old chickens is only good for 60 at three weeks' old. The beginner with small means—and thus unable to purchase a good class of brooder—would be far better off, in most cases, by brooding his chickens with hens on the plan outlined in "Rearing and Management of Chickens," than attempting to rear larger numbers in the many contrivances in evidence wherever one goes. There is a tendency on the part of the beginner to spend more money on his layers than on the rearing equipment. The reverse should be the case. No success is possible without the ability to rear successfully.

Overdue Hatchings.

Inquiries are being received in regard to belated hatchings during the winter. The principal cause of hen eggs hatching later than the twenty-first day, is insufficient heat and stale eggs. To define the latter, it might be stated that eggs over six days old should be regarded as stale for incubators, and over twelve days old as too stale for setting under hens. As regards the heat, during very cold weather, the eggs not only take longer to warm up, but outside temperatures influence both incubator and hen settings in the early stages; thus an incubator might take some hours longer to get up the desired temperature than in warmer weather. Then, in case of the hen, she may appear to be setting well, but in reality not setting close, and the same thing happens. Again, the hen herself might be a factor. A poor conditioned hen is not a fit subject to incubate eggs, having less bodily heat than a good robust bird. The chickens are likely to be weak, and late to hatch as a result. Cooling the eggs in cold weather has the same effect. Want of vigour in the parent stock is still another cause, the resultant chickens being weak, take longer to break their way out of the shell.

Time to stop Setting Eggs.

In all but the cooler parts of the State, the end of September should see the last batches of eggs set. It is inadvisable to carry the hatching far into October. It is quite understood what the temptation is to prolong the hatching when one has fewer chickens out than is desired; but while there are exceptions to most rules, the exceptions to this are few, and occur chiefly where but few chickens are raised, and exceptional conditions obtain. But generally speaking, late chickens are a source of endless trouble, and scarcely ever profitable, and may be summed up as late-hatched, late to develop, late to lay, poor layers at best, and most susceptible to disease.

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

Branch.	Honorary Secretary.
Albury	Mr. J. Brenn, "Silvania," Racecourse Road, Albury.
Baan Baa	Mr. P. Gilbert, Baan Baa.
Balldale	Mr. H. Elrington, Balldale.
Bathurst	Mr. J. McIntyre, Orton Park.
Batlow	Mr. A. C. Arnot, Batlow.
Beckom	Mr. S. Stinson, Beckom.
Borambil	Mr. H. A. D. Crossman, "Homewood," Quirindi.
Bungalong	Mr. G. H. Pereira, "Springdale," Cowra Road, *viâ* Cowra.
Canadian	Mr. C. Smith, Canadian Lead.
Cardiff	Mr. F. B. Cherry, Cardiff.
Carlingford	Mr. D. K. Otton, Carlingford.
Cattai	Mr. A. J. McDonald, Cattai, Pitt Town.
Collie	Mr. C. J. Rowcliff.
Coonabarabran	Dr. F. G. Failes, Coonabarabran.
Coradgery	Mr. J. Clatworthy, Beechmore, Millpose, Parkes.
Coraki	Mr. G. E. Ardill, Bungawalbyn.
Coreen-Burraja	Mr. N. B. Alston, Coreen, *viâ* Corowa.
Courangra	Mr. S. H. Warland, Courangra, *viâ* Brooklyn.
Cowra	Mr. E. P. Todhunter, Cowra.
Crudine	Mr. F. W. Clarke, Crudine.
Cundletown	Mr. S. A. Levick, Roseneath, Cundletown.
Deniliquin	Mr. W. J. Adams, jun., Deniliquin.
Derrain	Mr. A. P. Hunter, Red Bank Creek, Matong.
Dubbo	Mr. T. A. Nicholas, Dubbo.
Dunedoo	
Erudgere	Mr. Frank Hughes, Erudgere.
Fairfield West	Mr. J. H. Spargo, Hamilton Road, Fairfield.
Fernbrook	Mr. W. Marks, Yarrum Creek, Dorrigo.
Forest Creek	Mr. W. Thompson, Forest Creek, Frogmore.
Garra and Pinecliff	Mr. A. S. Blackwood, "Netherton," Garra, *viâ* Pinecliff.
Gerringong	Mr. J. Miller, Gerringong.
Grenfell	Mr. G. Cousins, Grenfell.
Gunning	Mr. E. H. Turner, Gunning.
Henty	Mr. H. W. Smith, Henty.
Hillston	Mr. M. Knechtli, Hillston.
Inverell	Mr. W. A. Kook, Rock Mount, Inverell.
Jerrara	Mr. A. O. Lane, Public School, Mullengrove, Wheeo.
Jindabyne	Mr. Sylvester Kennedy, Jindabyne.
Katoomba	Mr. C. Wooller, Oliva Park Farm, Katoomba.
Keepit, Manilla	Mr. J. B. Fitzgerald, Keepit, *viâ* Manilla.
Kellyville	Mr. Joseph Nutter, Kellyville.
Kenthurst	Mr. J. R. Jones, Kenthurst.
Laukey's Creek (Jingellic)	Mr. G. J. Nicholls, P.O., Jingellic.
Leech's Gully	Mr. Cecil G. Chick, Tenterfield.
Leeton	Mr. C. Ledwidge, Farm 442, Leeton.
Little Plain	Mr. F. S. Stening, Little Plain, *viâ* Inverell.
Lower Portland	Mr. W. C. Gambrill, Lower Portland.
Mangrove Mountain	Mr. G. T. Hunt, Mangrove Mountain, *viâ* Gosford.
Martin's Creek	Mr. P. Laney, Martin's Creek, *viâ* Paterson.
Meadow Flat	Mr. F. J. Brown, "The Poplars," Meadow Flat, *viâ* Rydal.
Middle Dural	Mr. A. E. Best, "Elliceleigh," Middle Dural.
Milbrulong	Mr. O. Ludwig, Milbrulong.
Mittagong	Mr. W. S. Cooke, "Fernmount," P.O., Alpine.
Moruya	Mr. P. Flynn, Moruya.
Narellan	Mr. G. J. Richardson, Narellan.
Narrandera	Mr. C. F. Pearce, Narrandera.
Nelson's Plains	Mr. M. Cunningham, Nelson's Plains

Branch.	Honorary Secretary.
New Italy	Mr. F. A. Morandini, New Italy.
Nimbin	Mr. J. T. Hutchinson, Nimbin.
Orangeville	Mr. C. Duck, Orangeville, The Oaks.
Orchard Hills (Penrith) ...	Mr. H. Basedow, Orchard Hills, *viâ* Penrith.
Parkesbourne	Mr. W. H. Weatherstone, Parkesbourne.
Peak Hill	Mr. A. B. Pettigrew, Peak Hill.
Penrose-Kareela	Mr. A. J. Bennett, "Brookvale," Kareela.
Ponto	Mr. A. D. Dunkley, Ponto.
Redbank	Mr. J. J. Cunningham, Redbank, Laggan.
Ringwood	Mr. Wm. Tait, Ringwood.
St. Mary's	Mr. W. Morris, Queen and Victoria Streets, St. Mary's.
Sackville	Mr. Arthur Manning, Sackville.
Sherwood	Mr. J. E. Davis, Sherwood.
Stockinbingal	Mr. J. Neville, Stockinbingal.
St. John's Park	Mr. J. O. Scott, St. John's Park.
Tallawang	Mr. G. Lincoln, junior, Tallawang.
Taralga	Mr. Dave Mullaney, Stonequarry, Taralga.
Temora	Mr. J. T. Warren, "Mortlake," Victoria-street, Temora.
Toronto	Mr. J. G. Desreaux, Esmond, Toronto.
Tumbarumba	Mr. R. Livingstone, Tumbarumba.
United Peel River (Woolomin).	Mr. C. E. Burke, Woolomin.
Upper Belmore River ..	Mr. A. W. Fowler, Upper Belmore River, *viâ* Gladstone, Macleay River.
Uralla	Mr. E. A. Neil, Uralla.
Valla	Mr. A. E. T. Reynolds, Valla, *viâ* Bowraville.
Wagga	Mr. Thos. Fraser, Aberfeldie, Wagga.
Walla Walla	Mr. H. Smith, Walla Walla.
Wallendbeen	Mr. W. J. Cartwright, Wallendbeen.
Walli	Mr. Geo. Edgerton, Applewood, Walli.
Wetherill Park	Mr. L. Rainbow, Wetherill Park.
Wollun	Mr. Robert Turner, Wollun.
Wolseley Park	Mr. H. McEachern, Wolseley Park.
Wyan	Mr. C. W. Harper, Myrtle Creek Railway Station.
Wyong	Mr. Edgar J. Johns, Wyong.
Yass	Mr. Cyril Ferris, Yass.

Notice to Honorary Secretaries.

It is important that a record of the meetings of the branches should be inserted in the *Agricultural Gazette*, and honorary secretaries are invited to forward to the Department a short account of the proceedings of each meeting, with a brief summary of any paper which may have been read, and the discussion that followed it, as early as possible after each meeting. Notes for insertion in the *Agricultural Gazette* must reach the Department before the 16th to ensure insertion in the following month's issue.

Insect Pests.—Quite a number of the branches have availed themselves of the Department's offer to supply a set of insects, being the common pests of the district, and the collections are now being cased. The Government Entomologist suggests that as each district has certain pests peculiar to its orchards and gardens, more useful work would be done if the members themselves collected the local pests (orchard, garden, and stock) and sent them to the Department, where they would be arranged, mounted, a descriptive label attached, and returned to the branch. Mr. Froggatt considers that such a collection would have a far greater value, as there would be more interest attached to the specimens when the members knew exactly where the pests came from, and where and how to find them.

REPORTS AND NOTICES FROM BRANCHES.

Canadian.

A paper was read by Mr. R. C. Hollow at a meeting of this branch, held on 4th July.

How to Build a Hay or Wheat Stack.

For those about to build a hay stack the first thing to do is to select the most convenient place or site. The whole area where the stack is to be built should be covered with rails or slabs, or a straddle 3 or 4 inches from the ground. The foundations being ready the builder should start in the centre by placing two or three sheaves flat on top of one another. Then he should set the sheaves neatly around, well up on one another, butts down on foundation, until he reaches the outside or the base is covered. He should now start to build a tier on the outside, and use a fork in doing so. If the outside layer has too steep an appearance, as is often the case in starting a stack, place two sheaves for the outside tier and one binder only, continue all around stack and then fill up the middle. It is advisable to reverse the binder sheaves occasionally in building the walls. Always make a point of starting away from a corner, and in building the corners always put the corner sheaf down first, and, with the fork, bend a few straws inward for the next sheaf to lie on. Make a practice of building inward from the corners, at least the width of half a dozen sheaves. As a rule the corners become low, and should be doubled frequently, that is, two sheaves for the outside, crossed on the corners, for one binder. In building with the fork you never have to trespass too close to corners, and by being on your feet instead of knees you can observe better whether your stack is coming up square.

The stack being ready for roofing, great care should be exercised by the builder, for if the first tier of sheaves in the roof, which is called the eave, has an inward dip it means a wet stack. Before placing the eave sheaves, the builder should start with a row of sheaves, butts out, about 2 feet in from the outside (or according to the length of the hay) along both sides; build the ends of the stack in the usual way and fill up the middle. Build another tier slightly in compared with the previous layer—binders well out, so as to make a high pillow for the eave sheaves—and fill up the middle. If the builder thinks the pillow is now high enough to give the eave sheaves the desired outward dip he can place them out level with the walls and bind them with the butts of the binder sheaves. It is here the fork is useful, for with the back of the prongs a hard hit is given the outside sheaves, which makes them lie down in their position nicely. Continue building the roof by giving the outside sheaves a good pitch outward. The middle should not at any time during the building of the roof be higher than the binder sheaves.

When the roof is completed, and after the stack has settled down a little, it should receive a good raking; after a shower of rain has fallen is the best time to rake, and an iron rake with prongs 3 or 4 inches long is the best implement.

I have been building stacks for many years and have never had one damaged in the least. I never bother about thatching, and some stacks have stood for two years and have opened up quite dry.

Coradgery.

The pruning and planting demonstration given by Mr. J. G. R. Bryant, Assistant Fruit Expert, on 7th July, at the orchard of Mr. H. N. Marriott, Hubberstone, Bogan Road, proved very successful.

Pruning and Planting Fruit Trees.

It is reported to be the general opinion of settlers that the soil is too heavy for fruit-growing, the summer too hot and dry, and white ants too destructive, but the officer mentioned was of the opinion that these disabilities can be overcome and most excellent fruit produced, though only by a thorough system of cultivation. The frequent disturbing of the soil will also disturb the white ants, and as an additional precaution, kainit or calcium carbide refuse should

be spread lightly round the tree and dug into the soil. A number of different varieties of trees were pruned, and methods of budding and grafting shown. Members realised that previously their pruning was done on a wrong system, and instead of leaving and encouraging the growth of fruit spurs on the main trunk and limbs, these were carefully removed, the result being that instead of the fruit being borne within easy reach and where it would be well sheltered and nourished, it was borne only on the outer edge of the limb and in the most exposed position. The planting was also a valuable object lesson. The ground had been well ploughed, the hole trenched to a depth of 12 inches and about 3 feet square, and the subsoil broken up, but not removed. Some of the top loam was then put back in the hole and the trees were planted about the same depth as in the nursery, the roots were well spread out (all bruised roots being removed), the stronger roots on that side from which the worst winds are experienced. Fine soil was sprinkled round the roots, the tree being continually moved up and down until the roots were well covered, then the soil was trodden firmly, so that when planting was completed it was impossible to pull the tree upwards in the least. Staking was therefore not required. Members realised that the cause of some of their failures had been planting too loosely and also too deep. Mr. Bryant strongly recommended a mulch of old straw to be spread around the tree, thereby retaining the moisture. The trees were headed back to a height of 18 inches. A winter spraying with lime and sulphur solution, he said, would mean healthy trees, and citrus trees attacked with scale should be treated with red oil emulsion in the proportion of 1 to 50.

The varieties recommended for the district were:—

Peaches.—Triumph, Wiggin's, Elberta, Lady Palmerston, California, Robert Stewart.

Nectarines.—New Boy, Goldmine, Meek's Scarlet, Lord Napier.

Apricots.—Moorpark, Hemskirke, Shipley's Blenheim, Mansfield's Seedling.

Pears.—Williams', Packham's Triumph, Easter Beurre, Josephine de Malines, Le Conte.

Apples.—Granny Smith, Statesman, Senator, Arkansas Black.

Plums.—Satsuma, Burbank, Climax, Wickson.

Prunes.—Prune d'Agen.

Figs.—White Adriatic, Brown Turkey.

Grapes, strongly recommended.—Black Muscat, White Muscat, Waltham Cross, Daria, Black Tokay, Red Hanneport, Doradillo.

Quinces.—Portugal, Missouri Mammoth.

Loquats.—Herd's Mammoth.

Almonds.—Ne Plus Ultra, Hatch's Nonpareil, Golden State, I.X.L.

Citrus trees were not recommended except where water was available, and the young trees should be sheltered and protected during the winter months for the first three years until well established.

Although the day was squally and cold a large number of members assembled, and a most excellent luncheon and afternoon tea was provided by Mrs. Marriott.

Deniliquin.

A lecture was delivered by Mr. H. C. Stening, Inspector of Agriculture, to the members of the above branch on 28th July. The chair was occupied by Mr. M. J. Carew, Chairman of the branch, and there was a good attendance.

The Chairman explained that, in consequence of the bad season, many farmers were feeding their stock, and were thus hindered from attending.

Wheat Culture in Dry Districts.

For the successful cultivation of wheat in dry districts the effectual storage in the soil of the natural rainfall was of the first importance, and wheat-growers were strongly advised to adopt the practice of fallowing, in order to conserve the winter rains (which were usually abundant), to be carried forward in the soil to supplement the falls during the growing period.

It had generally been considered that at least 10 to 12 inches of rain were required during the growing period for the production of a payable crop, but it had been amply demonstrated on the farmers' experiment plots that by adopting a system of fallowing a much smaller rainfall was sufficient. In 1911 a 14-bushel crop had been grown with only 322 points of rain during the growing period, and last year over 25 bushels with 713 points.

The many benefits to be desired from fallowing, other than the conservation of soil moisture, were also mentioned, and the best methods of cultivation explained, special emphasis being placed upon the necessity for summer cultivation of the fallow.

The lecturer described at length the characteristics of varieties suitable for dry districts, the treatment of seed, quantities, time, and depth to sow, and the advantage of manuring.

At the conclusion of the lecture, a number of questions were answered by the lecturer. A vote of thanks was moved by Mr. L. Harrison, and carried by acclamation.

Forest Creek.

On Tuesday, 4th August, Mr. J. G. R. Bryant, Assistant Fruit Expert, visited the district, and gave a demonstration of pruning in Mr. J. G. Chudleigh's orchard. There was a good number present, and many questions were asked about the methods employed, remedies for various diseases, &c. At the conclusion a hearty vote of thanks was accorded Mr. Bryant, on the motion of Mr. T. B. Prosser (chairman).

Immediately the demonstration was over the annual meeting of the branch was held. The Secretary's report showed that a fairly successful year's work had been done, and also that the finances were in a healthy condition, there being a balance of £5 5s. 4d. to credit. The election of officers took place, as follows:—Chairman, Mr. F. Morgan; Vice-Chairmen, Messrs. J. W. Prosser and J. G. Chudleigh; Treasurer, Mr. S. Gee; Hon. Secretary, Mr. W. Thompson.

Henty.

At a meeting of the above branch on 11th July, a paper dealing with "Buildings on the Farm," was read by Mr. C. Tovey. This will be referred to more in detail in the next issue.

A pruning demonstration, given by Mr. J. G. R. Bryant, Assistant Fruit Expert, at the orchard of Mr. A. P. Haberecht, on 7th August, proved a great success. There was an attendance of about seventy; amongst them farmers from Pleasant Hills, Round Hill, Buckaginga, and Ryan, a number of ladies, and the senior boys from the public school.

Mr. Bryant gave a practical demonstration of the pruning required by different varieties of fruit trees, and afterwards showed methods of grafting and budding. Great interest was taken by those present in the work done, and the lecturer had to answer many practical questions at the close of the demonstration.

A hearty vote of thanks was accorded Mr. Bryant for his valuable illustrations and explanations.

Hillston.

The annual meeting of this branch was held on 1st August.

The Secretary's report stated that during the year seven meetings had been held, most of which had been well attended. The membership was now

twenty-six, which it was hoped would be increased during the ensuing year. Several useful papers and addresses had been read during the year. The finances were in a good position, there being £2 11s. 2d. on hand.

The election of officers resulted as follows:—Chairman, Mr. W. Cashmere; Hon. Secretary and Treasurer, Mr. M. Knechtli.

Mr. J. Cashmere stated that his citrus, fig, and quince trees each year set a large crop of young fruit, but failed to hold them, the whole of them dropping off while young. He asked if any of the members could tell him the cause and a remedy. The trees, which had been planted some years, were originally planted in holes about 3 feet deep and 2 feet in diameter. The soil was a loose sandy soil, which he cultivated well, and he watered the trees whenever he thought necessary.

Mr. Ranken thought the holes the trees were planted in were too deep and too small, and the roots of the trees had become congested at the bottom of the hole. He suggested trenching the ground for some distance from the tree to the same depth as that of the original hole.

Mr. Lapthorne thought that in a loose sandy soil, where the soil was well cultivated, the roots should not have become congested. Root-pruning often had good results in such cases. The trouble might have been caused by the trees making too much wood.

It was decided that the Secretary should write to the Department with reference to the matter.

Mr. J. Cashmere remarked that in the case of pumpkin plants watered at the root he often found that the fruit on some of the long runners died away for want of water.

Mr. Ranken said a good plan in such a case was to thread a piece of wool through the stem of the runner, and put one end of the wool in a can of water.

Leech's Gully.

The usual meeting of this branch was held on 6th July.

Mr. Chick submitted for the information of members a sample of black winter rye, which had been sown for three months, and was about 3 feet 6 inches high. Mr. Chick explained that, as far as green-stuffs were concerned, it was one of the best winter fodders for Tenterfield, and he strongly advised all farmers to try a sample.

Reference was made to the "black" maize problem, and it was pointed out that several residents were under a wrong impression, as they thought the branch was trying to stop the importation of maize altogether; but this was not the case. What the branch wanted was a higher import duty placed on maize imported into Australia from foreign countries, so as to help the farmers in Australia to make maize-growing pay. At the present time it could be hardly made to pay, and when the Rural Workers' Union wages had to be met their position would be worse. It was stated that some people in Tenterfield thought the branch did not take the proper course in not calling a public meeting; but it was explained that as the Commission would be sitting shortly there was no time to be lost, and matters had to be rushed. The proposal would benefit all farmers in the State.

A member stated that all other tradesmen, workers, &c., were united, and it was time the farmers were.

Since the above meeting Mr. G. Steed has resigned from the secretaryship, and Mr. Cecil G. Chick has been appointed as his successor.

Leeton.

Mr. J. Hadlington, Poultry Expert of the Department of Agriculture, gave an interesting and instructive lecture at Leeton on 22nd July. There was a good attendance of ladies and gentlemen. Mr. W. M. Nulty presided.

The lecturer dwelt on incubation, housing, and types of fowls, illustrating his lecture by means of lantern slides. The lecture was very highly appreciated, and listened to attentively throughout.

Lower Portland.

The members of this branch held their annual reunion on 20th July. The function was most successful, and also resulted in the membership roll being augmented to the extent of thirteen.

The Secretary reported that the progress of the branch had been very satisfactory throughout the year. The membership totalled fifty-one. During the year eight ordinary meetings were held, at which papers were read on "Indian Cane," "Bee Culture," "Pig-raising," "Fruit-growing," "First Aid," "General Cultivation," and "Rockmelon Culture." A number of lectures and demonstrations were also given by departmental officers.

Martin's Creek.

Demonstrations of winter pruning and packing fruit were given by Mr. Bryant, Assistant Fruit Expert, at Mr. Burt's orchard on 11th June.

The advantage of the triangular system of packing over the square packing were fully explained by Mr. Bryant.

In the evening a lantern lecture on fruit-growing was delivered by Mr. Bryant. The demonstrations and lectures were all well attended, and greatly appreciated by those present.

Mittagong.

At a meeting of farmers and fruitgrowers, held at the State Farm Home, Mittagong, on 13th July, a branch of the Bureau was formed, with thirty-two members to commence.

The following gentlemen were elected as officer-bearers:—Chairman, Mr. J. V. Connolly; Vice-Chairman, Mr. A. E. Boswell; Treasurer, Mr. H. J. Healey; Hon. Secretary, Mr. W. S. Cooke.

Ponto.

The usual monthly meeting of this branch took place on 9th June, when there was a very good attendance. After the usual business, the Chairman introduced Mr. W. R. Birks, Inspector of Agriculture, who delivered an instructive lecture, illustrated by lantern views.

Wheat-growing and Cultivation.

Mr. Birks stated that the subdivision into four or five paddocks, and treating them in rotation and on the same scale, was likely to prove good practice in the district. Such paddocks could be treated thus: Commence by fallowing in June, keeping the fallow worked until next sowing; then sow a slow-maturing, heavy-yielding variety of wheat. Second year, plough lightly, work well with a cultivator, and sow an early-maturing variety of wheat. Third year, plough and sow oats or barley. Fourth year (if the rotation is a four-year one), break up the land, sow some fodder crop, such as rape, and break up in June for fallow, thus commencing the cycle again. If a five-year cycle is preferred, the land could be grazed the whole of the fourth year, and fallowed in the fifth year.

The advisability of sowing early-maturing varieties of wheat for hay, such as Firbank, so that the farmer would have ample time to complete hay-making before the grain harvest, was pointed out. Late-maturing varieties of wheat, such as Zealand, would not be fit to cut until other grain wheats were ripening.

Lantern views were shown of some comparatively new cultivators and skim ploughs that are likely to prove very useful in working fallow land, where neither the one-way disc nor the spring-tooth cultivator is wholly satisfactory.

Another important matter which was explained was the value of manuring crops on most soils. The expense of the manure was but a fraction compared with the increased yield so obtained. It was also pointed out that in the case of superphosphate the manure was not washed out of the ground, so that an application of this manure was never a losing investment. What was not used up by the wheat crop remained to increase the growth of grass and herbage for subsequent grazing.

A short account of the properties of some of the wheats recommended for the district aroused much interest and friendly discussion. Those most favoured were Rymer, Yandilla King, Marshall's No. 3, Federation, Warren, Firbank and Florence.

In reply to inquiries, the speaker gave a short explanation of "partial sterilisation," and suggested that possibly this occurred in the baking and complete drying out of the soils in the drier parts of our own country in drought time, and this possibly explained the remarkably rapid and luxuriant growth of feed after the break-up of a dry spell.

Many other subjects were well explained, such as the treatment of wheat for bunt, &c.

Tallawang.

The regular meeting of the Tallawang branch was held on 26th July. Among the correspondence read was a communication from the Department of Agriculture, giving directions as to the best method of applying lime to land, the quantity to be used, and the proper time to apply it.

A paper on building a haystack, which had been read by Mr. B. C. Hollow before the Canadian branch, and which had been received from that branch, was read by the Secretary, and discussed by members.

Temora.

A new branch has been established at Temora, with the following office-bearers:—Chairman, Mr. W. de Little; Vice-Chairman, Mr. H. A. Dahlenburg; Hon. Secretary and Treasurer, Mr. J. T. Warren.

The following paper was read by Mr. W. de Little, at the meeting held on 1st August: —

Seed-Wheat Varieties.

A matter of great importance to us as wheat-growers is: which are the best three wheats to grow in this district? At present we grow Federation, Yandilla King, Marshall's No. 3, Purple Straw, Steinwedel, Gluyas, Rymer, Comeback, Bunyip, Firbank, Dart's Imperial, Bobs, Cedar, and a number of other varieties. When you come to consider the question, there are only three best varieties, and these should consist of an early wheat, a medium wheat, and a late wheat, and I think we would be doing some good if we could devise a system of collecting statistics of yields, &c., for five years to help in determining the point.

As it appears that the bulk-handling of wheat is favoured by the majority, and is therefore likely to be introduced, the question of grading wheat, which it is alleged will give the growers a better price, has to be considered in this way: how are all the above wheats to be graded to make a fair average quality wheat? Grading Federation will never make it of equal value to Comeback from the millers' point of view, as they now offer 3d. per bushel more for Comeback than for Federation. If the wheats were reduced to three varieties, the matter of grading into even lots would be easier.

Then there is the question of the best yielding wheat. The best milling wheat, as a rule, is not the best yielding, and for the sake of the extra yield will it pay to allow our wheats to deteriorate in milling qualities? With the experiments being carried on at the various Government farms and by a few wheat-growers, there must be new wheats coming into favour every few years, and unless kept in check in some way, the list of wheats grown will become larger. A tabulated list of yields would show some growers that they are losing time and money by sowing a great many of the wheats mentioned.

I would suggest that this meeting (if you agree with the view that there are too many varieties of wheat grown) might make out a list of questions to be asked, and that they should be sent to growers willing to answer them after next harvest.

United Peel River (Woolomin).

A new branch was formed at Woolomin on 8th June, to be called the United Peel River Branch. A good start has been made with twenty-five members, the annual subscription being fixed at 2s. 6d. per member. The following are the office-bearers:—Chairman, Mr. J. W. Newman; Vice-Chairmen, Messrs. J. P. Prisk and H. J. Hannaford; Hon. Secretary and Treasurer, Mr. C. E. Burke.

Upper Belmore River.

The usual monthly meeting of this branch was held in July, when a paper on "Potato Diseases and Their Treatment" was read by the Secretary, Mr. A. W. Fowler.

Spraying for Thrips.

As summer approaches, the apple and pear buds will be swelling, and the spraying of these trees for thrips with lime-sulphur may be undertaken as late as a week before the buds begin to open. It is, of course, necessary that the dilute or summer strength of the lime-sulphur wash be used at this stage, as the sap is then moving.

As soon as the buds swell, even before the "pinking" stage, tobacco wash must be used; while later, as the blossoms are expanding and become full-blown, if thrips are still in evidence, the spraying with tobacco wash should be repeated.

The proportions recommended for the tobacco wash are 1 lb. of tobacco refuse to 2 gallons of water. The addition of a little soft soap (about ¼ lb. to the quantities mentioned) will be an advantage in the first tobacco spraying, as it makes the tobacco adhere better, but it is advisable to use it still more sparingly in the later sprayings on the open blooms.

To make this wash, steep the tobacco in a bucket with, say, a gallon of water, and let it stand overnight. Strain off the liquid in the morning, and add the soft soap, together with a gallon of hot water. Apply while still warm, though not hot.

If it is inconvenient to use the tobacco refuse, there are various commercial preparations of nicotine on the market which may be applied at suitable strengths.

In America, there have been recommendations to add from 1 to 2 per cent. of "Distillate oil" to the tobacco wash to aid in spreading the nicotine. This oil is probably a hydrocarbon or petroleum distillate oil, sold under the general name of "Distillate" there, but apparently not known as such in New South Wales. In view of the fact that, if this distillate were asked for by the orchardist, it is possible that one of several widely varying products would be supplied, the use of which might be dangerous both to the user and to the tree, it is suggested that, until the distillate as known in the States can be actually tested by the Department on the thrips attacking fruit blossoms, it should not be added to the tobacco wash in this country.—W. B. Gurney, Assistant Entomologist.

Orchard Notes.

W. J. ALLEN.

SEPTEMBER.

Green Manure.

GREEN manures or any weeds that have not been turned under with the plough should be dealt with without delay. Whilst green manures have their value, when handled in a proper manner, it is most injurious to delay turning them under until late in the spring, as this should be done early enough to permit of complete rotting. This precaution is very necessary in the case of citrus-fruit orchards. During the past few seasons a great deal of attention has been devoted to the growing of crops between the rows of trees for the purpose of green manuring. In many cases it is found that the ploughing under of the crops is delayed, with the result that they are hard to cover in ploughing, and further, dry out the soil to an injurious degree.

Cultivation.

During the early spring and right along through the summer months the orchard should be kept in a thorough state of tilth. To this end the plough, spring-tooth cultivator, harrow, and disc cultivator require to be brought into use according to the soil which is being operated upon. Regular and repeated stirring of the soil with a spring-tooth cultivator keeps the ground in a nice loose friable condition, which enables it to hold the maximum amount of moisture.

Spraying.

The orchardist has many operations that require attention at this season. Spraying is one that cannot be overlooked, for when disease secures a hold curative measures have to be adopted, whereas preventive measures always give the best results.

If the spring proves wet, it is advisable to spray trees which have in previous years shown signs of fungus or insect diseases, such as peach curl or aphis in the peach trees, black spot or scab in the apple, and shot-hole fungus in the apricot. Bordeaux mixture and lime-sulphur will be found the best sprays at this time of the year for all fungus diseases. For scale insects on deciduous trees lime-sulphur will be found effective. For aphis on apple or peach trees tobacco solution is a good contact spray. Never spray any trees or vines when they are in bloom, as the chances are that the crops will be destroyed. They may be sprayed a week before coming into bloom, and a week after the fruit is set.

Loosening Soil around Trees and Vines.

All soil should be loosened, either with a fork hoe or chipping hoe, around trees and vines, and all couch grass, sorrel, or other weeds removed and burnt. This work should be carried out in the early spring, while the soil is moist and easy to work.

Planting Citrus Trees.

This work should be completed before dry weather sets in. The ground should be well worked and in a friable condition.

Re-working Trees.

If done at once, it is not too late in the cooler districts to head back and re-graft old trees with varieties more suitable for market requirements.

Budding.

Wherever the sap is running freely, and the bark lifts well, this work should be pushed on amongst the young citrus stocks.

In re-working an old tree, it is well to put in plenty of buds, so that if a few do not take there will be enough left from which to start the new top. The bud should always be inserted about where it is desired to have a branch. This will ensure a well-formed tree, which should carry some fruit the second year.

As soon as it is discernible which buds have taken, the branch may be cut back. It will be found that these buds will soon make a growth, and they will then need to be tied to a stake in order to prevent them being blown off.

Pruning.

Citrus trees should receive an annual thinning out. Dead wood and old worn-out and dying shoots throughout the body of the tree should be removed. A copy of the Department's book on "Pruning" should be in the hands of every orchardist.

Codlin Moth.

Spraying with arsenate of lead for codlin moth is now compulsory, and growers should begin the application in accordance with the regulations. The exact time must be governed by the district in which the grower resides. Soft water should be used for diluting the arsenate of lead; rain water is most suitable.

The success of the method is unquestionable. It has been proved time and again that those who spray systematically, and pick up and destroy all fallen and infested fruit, succeed in harvesting over 90 per cent. of clean fruit, while those who neglect spraying are lucky if they succeed in harvesting 40 per cent. of clean fruit.

Fruit-growing on the North-western Plains.

A correspondent at Gurley Siding, between Narrabri and Moree, asks what kind of grapes do best in black soil, and which are the better—seedling oranges or grafted trees?

In reply, the Fruit Expert stated that the following grapes might be tried on the class of soil mentioned:—Ferdinand du Lesseps (early grape), Waltham Cross, Snow's Black Muscat, and Black Hambro. The two best oranges to plant would be Valencia Late and Washington Navel, but it was not recommended that they should be grown from seedlings.

Department of Agriculture, Sydney, 2nd September, 1914.

To stand the season at Hawkesbury Agricultural College, Richmond, the Pure-bred Imported Clydesdale Stallion,

ROYAL WARDEN (16045) C.S.B.

Royal Warden is a rich bay, showing good quality, combined with substance. He possesses an excellent temper. He was imported in 1912, from Scotland, by the Government of New South Wales. Bred by James Merson, Craigwillie, Huntly, Aberdeenshire. He was awarded first and champion prizes at the Royal Agricultural Show, Norwich, England, 1911.

Sire: Everlasting (11331) C.S.B.

1st Dam: Gem of Craigwillie (21597) C.S.B., by Prince Thomas (10263) C.S.B.

2nd Dam: Lady Edith of Craigwillie (15687) C.S.B., by Prince of Carruchan (8151) C.S.B.

3rd Dam: Jean of Northfield (18564) C.S.B., by Star of the North (2435) C.S.B.

4th Dam. Cowden Jean (19435) C.S.B., by Clydesdale Jock (1415) C.S.B.

Foaled 15th April, 1908.

Fee: Five guineas per mare, or any number over two from the one owner, at £4 4s. each.

By arrangement with the Principal, a limited number of mares may be taken at agistment at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE PRINCIPAL,
Hawkesbury Agricultural College,
Richmond, N.S.W.

To stand the season at Wagga Experiment Farm, the Imported Pure-bred Stallion,

CLANDALE (14628) C.S.B.

Clandale is a beautiful bay horse of substance, and most exceptional quality. He possesses the best of legs and feet. He was bred by Wm. Cochrane, Port Logan, Wigtonshire. He was awarded first prize at Aberdeen Show, Scotland, 1912.

Sire · Allandale (12418) C.S.B.

1st Dam: May Logan (21199) C.S.B., by Prince Robert (7135) C.S.B.

2nd Dam: Haidee (21198) C.S.B., by Prince of Wales (673) C.S.B.

3rd Dam: Jess of Portlogan (3145) C.S.B., by Lofty (460) C.S.B., by Hercules (378) C.S.B.

4th Dam: Kate.

Foaled May 10th, 1907.

Fee: Five guineas per mare, or any number over two from the same owner, at £4 4s. each.

By arrangement with the Manager a limited number of mares may be taken at agistment at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE MANAGER,
Experiment Farm, Bomen, Wagga Wagga.

To stand the season at Cowra, the Pure-bred Clydesdale Stallion,

ROBIN ADAIR (16013) C.S.B.

Robin Adair is a big upstanding horse of great substance. He shows good character and good temper. He was bred by Thos. Lean, Wester Deans, Leadburn, and was selected by the Clydesdale Association to represent the breed at the Olympia International Horse Show. He was imported in 1912 by the Government of New South Wales.

Sire: Royal Walter (13717) C.S.B.

1st Dam: Rossie (19808) C.S.B., by Alexander Everard (14242) C.S.B.

2nd Dam: Bell of Western Deans (14652) C.S.B., by Prince of Brunstone (9977) C.S.B.

3rd Dam: Darling of Wester Deans (14651) C.S.B., by Top Knot (6360) C.S.B.

4th Dam: Blossom of Wester Deans (14649) C.S.B., by Stonelaw Lord Lyon (2400) C.S.B.

5th Dam: Bell of Westside (23030) C.S.B., by Pride of Kyle (3904) C.S.B.

Foaled May 30th, 1909.

Fee: Five guineas per mare, or any number over two from the one owner, at £4 4s. each.

By arrangement with the Manager, a limited number of mares may be taken at agistment, at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE MANAGER, Experiment Farm, Cowra.

To stand the season at Yanco Experiment Farm, the Champion Blood Stallion,

BEN NEVIS.

Ben Nevis is of a beautiful seal brown colour, 8 years old, 16 hands, with splendid flat bone and excellent conformation, and is one of the best utility horses in the State for producing weight carrying Hacks and Harness Horses.

Sire: Dick Swiveller, a well-known performer, and the winner of many races during his turf career.

G. Sire: Swiveller, sire of Mentor (winner of the Melbourne Cup).

Dam: Queenie, by Emulate, by Emulation, who was sire of the well-known racehorse Sardinos, who won the Adelaide Cup, carrying 9 st. 6 lb.

Ben Nevis is the winner of numerous first prizes, taking a first prize in 1912, four firsts in 1913, and holds unbroken record as Remount Stallion.

Fee: Four Guineas.

For all particulars, apply— THE MANAGER,
Experiment Farm, Yanco.

Department of Agriculture,
Sydney, 2nd September, 1914.

BULLS FOR SALE

AT BERRY EXPERIMENT FARM.

HOLSTEIN.—Duke of Hanover (374): date of birth, 5th September, 1912; colour, black and white; sire, Neitenstein, by Hollander; dam, Lolkje Field, by Garfield (imp.); g d, Lolkje, by Joubert; g g d, Lolkje Veeman (imp.), by Standfries 3rd. Price, **12 guineas.**

Milk yield of Lolkje, 5,828 lb. milk, 3·5 per cent. test, 234 lb. butter. 1st calf.
,, ,, Lolkje Veeman (imp.), 11,960 lb. milk, 479 lb. butter.

GUERNSEYS.—Mountain Prince (593): date of birth, 12th January, 1913; colour, lemon and white; sire, Calm Prince; dam, Angelica 8th (imp.). Price, **30 guineas.**

Rohais' Lad (601): date of birth, 18th March, 1913; colour, lemon and white; sire, Calm Prince; dam, Rohais' Lassie (imp.). Price, **40 guineas.**

Milk yield of dam:—	Milk lb.	Fat per cent.	Butter lb.
Rohais' Lassie	5,537	5·1	333

Othello (605): date of birth, 4th April, 1913; colour, lemon and white; sire, Trengwaintou Village Favourite (imp.); dam, Desdemona 8th (imp.). Price, **35 guineas**

Milk yield of dam:—	Milk lb.	Fat per cent.	Butter lb.
Desdemona 8th (imp.)	6,721	4·3	340

GEORGE VALDER, Under Secretary, and
Director of Agriculture.

Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull.	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn ...	Melba's Emblem (183 M.S.H.B.)	Emblem of Darbalara (100 M.S.H.B.)	Melba 3rd of Darbalara (1058 M.S.H.B.)	Berry	‖
" ...	Imperialist ...	Florio	Lady Nancy of Minembah.	Berry Farm ...	*
" ..	The Irishman (imp.)	Tipperary Bull	Colleen Bawn (imp.)	Berry Farm ...	†
Jersey ...	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Yanco Farm ...	*
" ...	Trafalgar ...	Best Man ...	Rum Omelette	Cowra Farm ...	*
" ...	Kaid of Khartoum	Sir Jack ...	Egyptian Belle	H. A. College ...	*
" ..	Leda's Retford Pride.	Dinah's Lad ..	Leda's Angel..	Wagga Farm ...	‖
Guernsey ...	The King's Mirror	Calm Prince ...	Vivid (imp.)...	Wollongbar ...	†
" ...	Star Prince ...	Calm Prince ...	Vivid (imp.)...	Casino	21 Oct., '14.
" ...	Sky Pilot ...	Prince Souvia ...	Parson's Red Rose (imp.).	Maclean	11 Jan., '15.
" ...	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (6509)	Inverell	5 Oct., '14.
" ...	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	‖
" ...	Claudius (imp.)	Golden Star II..	Claudia's Pride (imp.).	Murwillumbah ...	1 Jan., '15.
" ...	George III ...	King of the Roses	Calm 2nd ...	Mullumbimby ...	31 Mar., '15.
" ...	The Peacemaker	Calm Prince ...	Rose Petersen	Wollongbar ...	*
" ...	King of the Roses	Hayes' King ...	Rosey 8th (imp.).	Pambula	31 Dec., '14.
" ...	Lauderlad ...	Laura's Boy ...	Souvenir of Wollongbar	Casino	3 Sept., '14.
" ...	Belfast	King of the Roses	Flaxy 2nd ...	Tyalgum	28 Nov., '14.
" ...	Royal Preel ...	Itchen Royal ...	Hayes' Lily du Preel (imp.).	Tyalgum	30 Nov., '14.
" ..	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Frederickton ...	— Sept., '14.
" ...	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	Paterson-Vacy ..	11 Sept., '14.
Ayrshire ...	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose...	Grafton Farm ...	*
" ...	Wyllieland Bright Lad (imp.)	Wyllieland Gleniffer (7229)	Wyllieland Sangie	Glen Innes Farm..	*
" ...	Isabel's Majestic	Majestic of Oakbank.	Isabel of Gleneira.	Grafton Farm ...	‖
Kerry... ...	Rising Sun ...	Bratha's Boy ...	Dawn ...	Bathurst Farm ...	*

*Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed.
‖ Available for special service upon application to the Under Secretary.

STALLION PARADES.

Date.		Place.	Time.
Wednesday,	2 September	Cowra	10 a.m.
,,	2 ,,	Gunning	10 a.m.
,,	2 ,,	Tamworth	10 a.m.
Thursday,	3 ,,	Lyndhurst	3 p.m.
,,	3 ,,	Singleton	2 p.m.
,,	3 ,,	Yass	10 a.m.
Friday,	4 ,,	Burrowa	10 a.m.
Monday,	7 ,,	Dunedoo	2 p.m.
Tuesday,	8 ,,	Newcastle	2 p.m.
,,	8 ,,	Goulburn	10 a.m.
Wednesday,	9 ,,	Gulgong	10 a.m.
Thursday,	10 ,,	Mudgee	10 a.m.
Friday,	11 ,,	Barraba	Noon.
,,	11 ,,	Rylstone	10 a.m
,,	11 ,,	Liverpool	11 a.m.
Saturday,	12 ,,	Manilla	10 a.m.
Monday,	14 ,,	Gundagai	8·40 a.m.
,,	14 ,,	Adelong	2·30 p.m.
Tuesday,	15 ,,	Oberon	10 a.m.
,,	15 ,,	Wollongong	11 a.m.
,,	15 ,,	Tumut	2·30 p.m.
Wednesday,	16 ,,	Bathurst	10 a.m.
,,	16 ,,	Blayney	3·30 p.m.
Thursday,	17 ,,	Millthorpe	11·30 a.m.
,,	17 ,,	Kiama	12·30 p.m.
,,	17 ,,	Dapto	3·30 p.m.
Friday,	18 ,,	Nowra	10 a.m.
Tuesday,	22 ,,	Milton	10 a.m.
,,	22 ,,	Wyong	11 a.m.
Wednesday,	23 ,,	Moruya	10 a.m.
Thursday,	24 ,,	Gosford	11 a.m.
Friday,	25 ,,	Cobargo	10 a.m.
,,	25 ,,	Camden	11·30 a.m.
Saturday,	26 ,,	Bega	10 a.m.
Monday,	28 ,,	Tenterfield	11 a.m.
Tuesday,	29 ,,	Tumbarumba	11·30 a.m.
,,	29 ,,	Nimitybelle	10 a.m.
,,	29 ,,	Guyra	10 a.m.
Wednesday,	30 ,,	Bombala	Noon.
,,	30 ,,	Glen Innes	10 a.m.
Thursday,	1 October	Armidale	10 a.m.
,,	1 ,,	Braidwood	10 a.m.
,,	1 ,,	Cooma	10 a.m.
Friday,	2 ,,	Walcha	2 p.m.
,,	2 ,,	Queanbeyan	10 a.m.
,,	2 ,,	Berridale	11 a.m.
Wednesday,	7 ,,	Moss Vale	2·30 p.m.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1914.

Society.	Secretary.	Date
Ganmain A. and P. Association	J. F. Ashwood	Sept. 15, 16
Cootamundra A., P., H., and I. Association	T. Williams	,, 15, 16
Cowra P., A., and H. Association	E. W. Warren	,, 16, 17
Murrumburrah P., A., and I. Association	J. A. Foley	,, 22, 23
Queanbeyan P. and A. Association	J. G. Harris	,, 22, 23
Temora P., A , H., and I. Association	J. Clark	,, 22, 23, 24
Riverina P. and A. Society (Jerilderie)	J. Kennedy	,, 23
Canowindra P., A., and H Association	G. Newman	,, 23, 24
Burrowa P., A., and H. Association	W. Burns	,, 24, 25
Henty P. and A. Society	H. L. Yates	,, 29, 30
Millthorpe A., H., and P. Association	C. J. E. Hawken	,, 29, 30
Yass P. and A. Association	W. Thomson	,, 30, Oct. 1
Urana P. and A. Society	J. Wise	,, 30, ,, 1
Hay P. and A. Association	G. S. Camden	Oct. 6, 7
Berrigan A. and H. Society	T. E. Crowther	,, 8
Crookwell A., P., and H. Society	J. H. Huxley	,, 9
Hillston P. and A. Society	S. J. Gordon	,, 14
Tweed River Agricultural Society	A. E. Budd	Nov. 11, 12
Mullumbimby A. Society	W. A. Davis	,, 18, 19
Lismore A. and I. Society	T. M. Hewitt	,, 25, 26, 27

1915.

Society.	Secretary.	Date
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Kiama A. Association	G. A. Somerville	,, 26, 27
Wollongong A., H., and I. Association	W. J. Cochrane	,, 28, 29, 30
Berry A. Association	S. G. Banfield	Feb. 4, 5
Wyong A. Association	C. R. Seabrook	,, 5, 6, 7
Shoalhaven A. and H. Association	H. Rauch	,, 10, 11
Newcastle A., H.. and I. Association	E. J. Dann	,, 10 to 13
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Bangalow A. and I. Society	W. H. Reading	,, 23, 24, 25
Macleay A., H., and I. Association	E. Weeks	,, 24, 25, 26
Upper Hunter P. and A. Association	R. C. Sawkins	,, 24, 25, 26
Dorrigo A., H., and I. Society	W. R. Colwell	,, 24, 25
Crookwell A., P., and H. Society	J. H. Huxley	,, 25, 26
Dungog A. and H. Association	C. E. Prout	April 28, 29
Northern A. Association	J. McLachlan	Sept. 22, 23, 24

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Farmers' Experiment Plots.

POTATO EXPERIMENTS, 1913-14.

TABLELAND DIVISION.

A. J. PINN, Inspector of Agriculture.

THE returns of the Coastal Division were published in the September issue of the *Gazette*. From a potato standpoint, however, the Tableland District is of more importance, the climatic conditions being more temperate, and therefore better suited for potato culture. The area planted is much larger, heavier yields are obtained, and the tubers are of better keeping quality.

During the past season experiments were carried out at fourteen centres in this division, covering in all an area of 23 acres. The tests comprised variety and manurial trials, and a rotation experiment.

As regards the season, that of New England must be regarded as good, whereas the Southern and Western Districts experienced a very dry summer, a few places only being benefited by thunderstorms. In the latter districts no beneficial rain was experienced until March, the monsoonal visitation being about six weeks late.

Had it not been for the fact that the autumn was of exceptional length, the crops in these divisions would have been practically failures. Such a season naturally favoured the late-maturing varieties, and these produced fairly heavy crops.

Owing to the lateness of the rains, very little damage was done by the larvæ of the Potato Moth, and no loss was occasioned by "scab" in New England. From other experiments carried out by the Department, scab has always been more prevalent in dry seasons, and it would appear that the occurrence of the disease in most years is due more to physical causes rather than to fungoid attack. Very little loss was occasioned by Irish Blight; and as the season in some portions of the State was favourable to its development, the outlook is very hopeful, in so far that destructive attacks are only likely to appear in abnormal seasons, when potatoes are plentiful.

During the previous year much damage was caused by Rutherglen Bug, but it is pleasing to note that the ravages of this insect pest were almost negligible on the crop under review.

The following summary is of value, as indicating the relative yields of the different varieties throughout the State. The figures cannot, however, be

taken as absolutely comparable, because on one plot—Jindabyne—all the varieties were not planted:—

Variety	North					South					West					Average				
	No. of Trials	Average Yield				No. of Trials	Average Yield				No. of Trials	Average Yield				No. of Trials	Average Yield			
		t.	c.	q.	lb.		t.	c.	q.	lb.		t.	c.	q.	lb.		t.	c.	q.	lb.
Coronation	5	7	14	1	18	6	5	16	2	27	2	6	15	2	3	13	6	14	0	13
Queen of the Valley	5	7	13	1	1	7	4	7	3	22	2	5	18	0	5	14	5	15	2	8
Surprise	5	6	3	2	14	6	5	0	0	25	2	5	13	0	3	13	5	11	0	21
Manhattan	5	5	15	0	12	6	5	1	3	13	2	6	7	1	11	13	5	10	3	14
Premier	5	6	8	2	16	7	4	1	0	8	2	5	17	0	2	14	5	3	0	22
Brownell's Beauty	5	5	4	0	2	7	3	17	3	26	2	3	3	1	7	14	4	5	0	21
Carman No. 1	5	4	12	2	14	6	3	7	0	4	2	5	10	0	15	13	4	3	2	1
Satisfaction	5	5	6	2	20	7	2	18	2	4	2	3	19	1	8	14	3	18	2	22

Reviewing the above table, and comparing with the results of the previous year, it will be noted that the positions of merit occupied by the four leading varieties are the same.

As regards yield, the average is well above that of the previous season. The variety Carman No. 1 occupies a low position, but this was due to the seed deteriorating considerably on account of rather long storage in Sydney, resulting in a faulty germination after planting.

The following are the average yields in the manuring experiment:—

Manure	North					South					West					Average				
	No. of Trials	Average Yield				No. of Trials	Average Yield				No. of Trials	Average Yield				No. of Trials	Average Yield			
		t.	c.	q.	lb.		t.	c.	q.	lb.		t.	c.	q.	lb.		t.	c.	q.	lb.
P5 mixture	5	7	14	2	14	7	4	7	3	7	2	6	4	0	4	14	5	16	3	11
P4 ,,	5	7	13	1	3	7	4	7	3	22	2	5	18	0	5	14	5	15	2	8
P6 ,,	5	7	2	3	20	7	4	7	0	22	2	5	19	1	27	14	5	10	1	4
No manure	5	6	14	2	22	7	3	15	1	21	2	5	1	1	0	14	5	0	1	4

The manure mixtures used were as follow:—

P4 mixture— 4 cwt. sulphate of ammonia.
13 cwt. superphosphate.
3 cwt. sulphate of potash.

P5 mixture— 16 cwt. superphosphate.
4 cwt. sulphate of potash.

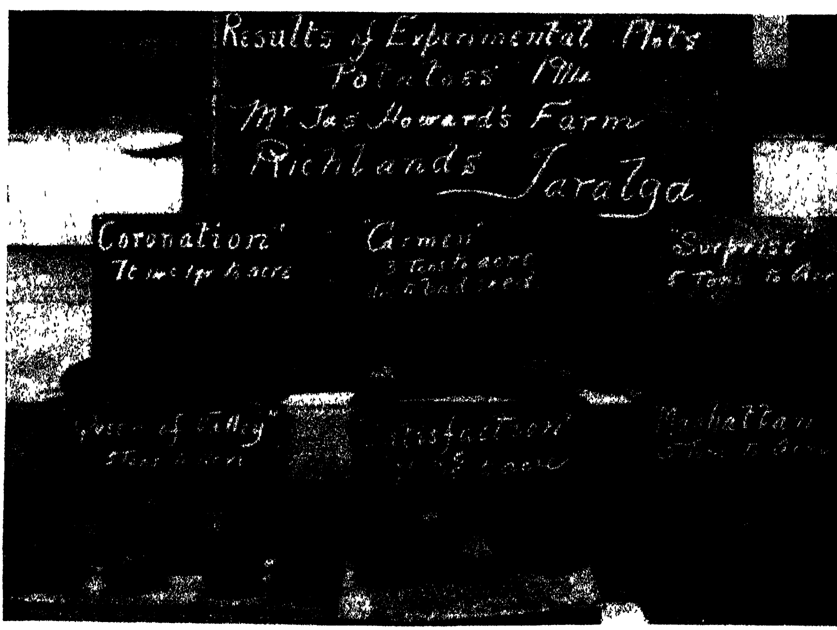
P6 mixture— 12 cwt. bone dust.
4 cwt. superphosphate.
4 cwt. sulphate of potash.

All mixtures were applied at the rate of 4 cwt. per acre.

The only change worthy of note as compared with last season is that P5 mixture occupies first place, leading the P4 mixture by an increased yield of 1 cwt. per acre. The results obtained would seem to indicate that the

Satisfaction Potatoes.

Well-sprouted Seed, 5 tons 3 cwt. ; New Seed, 2 tons 1 cwt.
(See page 747, September *Agricultural Gazette*). Mr. J. Wilson's Farm, Coramba.



Potato Variety Trial, Taralga.

Potato Manurial Trial.

Portion of Potato Variety Trial.

General View.

Potato Experiments. Mr. J. Wilson's Farm, Coramba.

FARMERS' EXPERIMENT PLOTS, 1913-14.

increased yield obtained by the P5 mixture is due to the larger percentage of phosphoric acid contained in this mixture. As the P5 manure contains no nitrogenous fertiliser the cost to the farmer is considerably less than that of the complete manure, the former being £7 10s. per ton, and the latter £9 15s. per ton. It will, therefore, be seen that a considerable saving will be made if the P5 mixture proves to be the one most suited to our conditions.

Northern Districts.

F. DITZELL, Assistant Inspector of Agriculture.

POTATO experiments were conducted in five different districts. The average area cultivated for the purpose was $1\frac{1}{10}$ acre, divided into individual plots of one-tenth of an acre each. The following are the names and addresses of the farmers who co-operated with the Department in the carrying out of these experiments:—

Mr. L. M. Rixon, Green Hill, Uralla.
Mr. S. Collins, Rose Valley, Black Mountain.
Mr. Wm. Moore, sen., Guyra.
Mr. T. Farlow, Mayfield, Red Range road, Glen Innes.
Mr. J. F. Chick, Hill View, Tenterfield.

The plots were all uniform, and consisted of eight varieties in the variety trial, all of which were manured with 4 cwt. of P4 mixture per acre, except at Uralla, where only 3 cwt. was applied. There were also three extra plots of one of the varieties, one unmanured, and the other two manured with 4 cwt. of P5 and P6 mixtures respectively, excepting again Uralla, where only 3 cwt. was applied.

Soil and Cultural Notes.

Uralla.—The soil was virgin, reddish, friable loam of ironstone derivation, and fairly fertile. It was cleared and mould-board ploughed 6 inches deep in April, 1913, and harrowed twice, then ploughed again in July, and afterwards harrowed and spring-tooth cultivated. On the 3rd November the potato sets were ploughed in, 16 to 18 inches apart, and 5 inches deep, in rows 2 feet 6 inches apart. The after-cultivation consisted of harrowing immediately after planting, and cultivating early in December, and again at the end of the month, the potatoes being hilled at the latter operation.

Black Mountain.—The soil was partly greyish and partly red loam, the former of hard sandstone formation and the latter ironstone. The red loam is richer than the grey, but both are poor soils. The previous crop was oats, unmanured, for hay. This land was mould-board ploughed 5 to 6 inches deep in July, 1913, harrowed immediately, then heavily rolled in August, cross-ploughed in September, and harrowed. On the 7th November the potatoes were planted 22 inches apart and 4 inches deep, in rows 3 feet apart, by means of a potato-planter, which worked satisfactorily. These planting distances were somewhat too wide, but could not be avoided. The ground was harrowed immediately after planting and again soon after germination,

and was later cultivated three times, hilling being carried out at the last cultivation. These plots were satisfactorily harvested with a potato-digger.

Guyra.—The soil was a rich, red, friable, basaltic loam, and the previous crop was wheat, unmanured, for hay. During the latter end of August this land was mould-board ploughed 5 inches deep, and was afterwards harrowed three times. The potatoes were ploughed in 4 inches deep on 5th November in rows 2 feet 9 inches apart, and 18 to 20 inches apart in the rows. After planting the land was harrowed, and was later cultivated and hilled at the one operation.

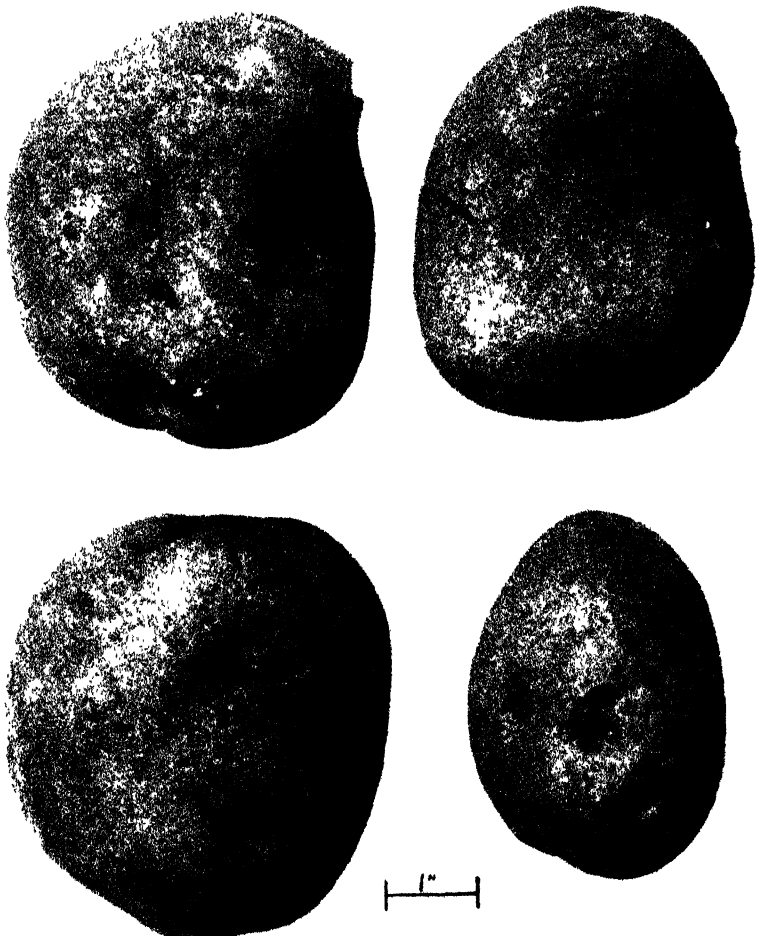
Glen Innes.—Here the soil was a friable, reddish, basaltic loam of fair fertility. The previous crop was partly potatoes and partly swede turnips, across which the plots were planted at right angles. The land was mould-board ploughed 7 inches deep in June, and then spring tooth cultivated twice, after which it was again ploughed and harrowed. The potatoes were ploughed in on the 4th November, 18 inches apart and 6 inches deep, in rows 2 feet 6 inches apart. The plots were harrowed immediately after planting and again when the potatoes were coming up. They were then scarified early in December, and hilled with a plough at the end of the month.

Tenterfield.—The soil here was a sandy loam of blue granite formation, good depth, and only medium fertility. The previous crop was oats, unmanured, for hay. The land was mould-board ploughed 6 inches deep in February, 1913, and was then spring tooth cultivated in May, in June, and again early in September, and immediately harrowed, after which it was ploughed, about the middle of September, and harrowed On the 22nd October the potatoes were ploughed in, 4 inches deep and 16 to 18 inches apart in rows 2 feet 8 inches wide. The after cultivation consisted of harrowing before and after germination, cultivating in November, again in December, and then hilling with the plough.

The Season.

At Tenterfield the season was not a favourable one for potatoes, the summer being too hot. The rainfall before planting from 1st July was:—July, 70 points; August, 29 points; September, 224 points; and October, 19 points. The ground was in splendid condition for planting, so a good germination was obtained in all the plots except Brownell's Beauty and Carman No. 1. The rainfall after planting was: October, 156 points; November, 108 points; December, 219 points; January, 113 points; February, 210 points; and March, 191 points. The March rainfall was of no benefit to the Satisfaction, and only of partial benefit to the other varieties. Up to January, all the varieties made a splendid top growth, and large numbers of tubers were formed, but hot and dry weather from January to March checked the development of the tubers. The season favoured the late maturing varieties more than the early ones.

The other plots in New England—Glen Innes, Guyra, Black Mountain, and Uralla—all experienced a good season, and some excellent returns were

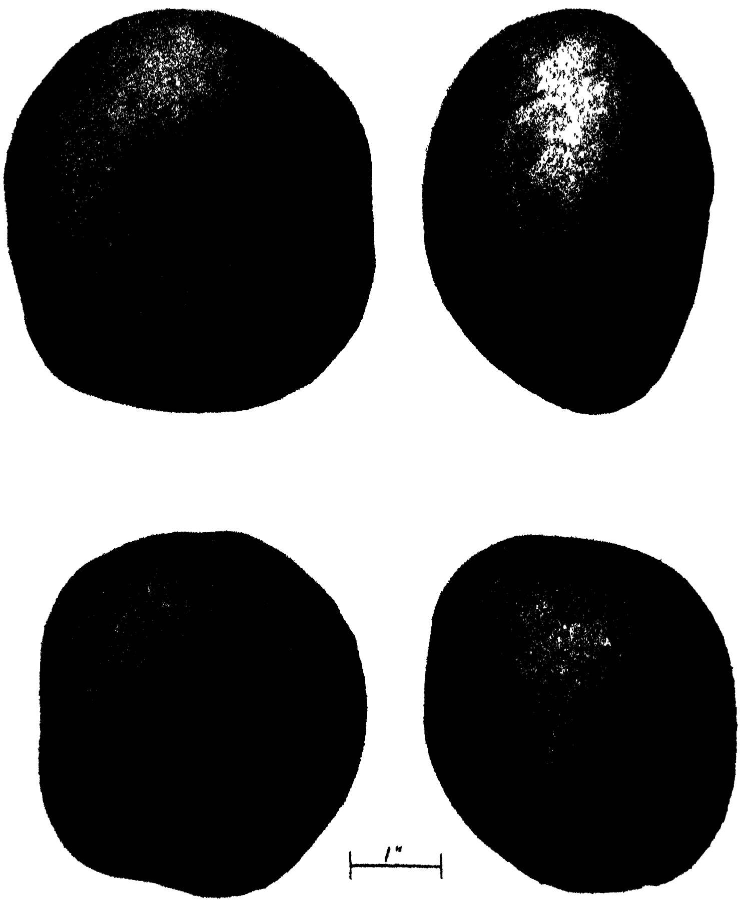


CORONATION

Potato Variety Trial, Nimmitabel.

Coronation yielded 11 tons 6 cwt. per acre.

FARMERS' EXPERIMENT PLOTS.



SATISFACTION

Potato Variety Trial, Nimmitabel.

Satisfaction yielded 6 tons 4 cwt. per acre.

FARMERS' EXPERIMENT PLOTS.

obtained. The rainfall in July and August was very low, but good falls in September, and a fair fall in October, ensured moist seed-beds, resulting in a good germination in all the plots of all the varieties except Carman No. 1. The rainfall in November was light, in December fair, and in the following months very good. The season here also favoured the late maturing varieties more than the early ones. In the Uralla plots, grasshoppers attacked the tops of Manhattan and Premier severely, and Satisfaction lightly, during the latter end of December. The other varieties escaped damage, apparently because their foliage was not so attractive to the grasshoppers.

Variety Trials.

The results obtained are given in Table A. The samples right through were free from scab and grub infestation. Only marketable tubers were included in the yields. Queen of the Valley easily topped the yields at Tenterfield with 5 tons 7 cwt. per acre, and was followed by Manhattan, Satisfaction, Coronation, and Surprise These results were satisfactory, as the season was somewhat unfavourable. A considerable number of potatoes were partly rotten, mainly where second growth took place, and these were rejected.

At Black Mountain, Coronation was first with 6 tons 10 cwt. per acre, being followed by Queen of the Valley, Surprise, Manhattan, and Premier. The yields here were not so high as at Guyra, Glen Innes, and Uralla, because the plots were situated on a poor soil. As already pointed out, the yields would have been higher had it been possible to plant more closely together.

The Guyra plots were again topped by Coronation, with the high yield of 9 tons 17 cwt. per acre, and Premier, Queen of the Valley, Surprise, and Manhattan were next in order of merit. The rich, red, basaltic loams of this district are ideal potato soils

The Glen Innes plots gave some splendid returns, Coronation topping the yield here also with 10 tons 1 cwt. per acre, while Premier, Queen of the Valley, Manhattan, and Surprise followed in the order named. The Red Range soils at Glen Innes are splendid potato soils.

At Uralla the highest yield in the New England plots was obtained, Queen of the Valley returning 10 tons 12 cwt. per acre. This was followed in order by Brownell's Beauty, Coronation, Surprise, and Satisfaction.

Reference to the average and percentage yields in Table A will show that for all the plots, Coronation topped the yields, but was very closely followed by Queen of the Valley. These two varieties were distinctly ahead of any of the others.

Varieties Recommended.

Of the eight varieties tested in the plots, all are recommended for general cultivation in New England except Brownell's Beauty, which, throughout the last five years, has failed to yield satisfactorily, and Carman No. 1, which was tested last season for the first time. It must, however, be pointed out that Carman No. 1 was at a disadvantage compared with the other varieties, as inferior seed resulted in many misses. It will be tried again next season.

Satisfaction matures in about four months, and has a vigorous top growth, with prominent heliotrope flowers. The tubers are round, light pink or whitish, and have only a few shallow eyes. This variety is well suited for the production of early crops.

Manhattan takes from four and a half to five months to mature, and produces a medium top growth, with thick, and often bluish, stems. The oblong flattened tubers are blue or mottled, and have fairly numerous shallow eyes with prominent "eyelids." A good marketable sample is always produced, and a hollow Manhattan is never found.

Surprise is a late variety. The top growth is very vigorous, tall, upright, with thick, whitish stems. The tubers are pinkish, rather longer than broad, flattened, with eyes fairly numerous, pinkish, and rather deep. Surprise is identical with the so called Freeman The tubers are generally large, and inclined to grow hollow, therefore they should be planted fairly close together.

Coronation matures in about five and one half months, and the top growth is medium, limp, and has whitish stems. The tubers are somewhat similar to those of Manhattan, but are rather more cylindrical, and slightly smoother. This variety is a very heavy yielder, but produces a large percentage of small potatoes. It is subject to second growth

Queen of the Valley is of about the same season as Coronation, and makes a fairly vigorous top growth. The tubers are oblong, rather flattened, red, with eyes fairly numerous and rather deep It is subject to second growth

Premier is the latest of the varieties mentioned, maturing in about six months, and has a medium top growth, with slightly bluish stems. The tubers are rather long, and pinkish to light red. It is liable to second growth

Manurial Trials.

The best results from the use of manures, as will be seen in Table B, were naturally obtained on the poorer soils At Tenterfield P5 gave the best return, being 1 ton 15 cwt. 3 qrs. in advance of the unmanured plot, at a cost of £1 10s. for manure, while at the Black Mountain P1 resulted in an increase of 1 ton 17 cwt. 1 qr. per acre over no manure at a cost of £1 19s. for manure. The results at Uralla also favour manuring, P4 giving an increase of 1 ton 8 cwt. 3 qrs. 24 lb. per acre over no manure, and in this case the extra expense was £1 10s. It is therefore seen that on the poor and medium quality soils of these districts manuring is profitable. On the richer soils at Glen Innes and Guyra such high increases were not obtained, and manuring does not appear to be so advantageous. The average and corresponding percentage yields for all the plots show that P5 and P4 gave an increase of about 14 per cent. over no manure, while P6 was not so satisfactory. The P4 mixture seems to be a profitable manure to use for the cool districts of Black Mountain and Uralla, while P5 mixture apparently gives the best results in the warmer district of Tenterfield, where nitrogen does not appear to be needed so much, probably because nitrification in the soil takes place rapidly during the summer months.

Potato Variety Trial, Nimmitabel.

Manhattan yielded 15 tons 1 cwt per acre.

FARMERS' EXPERIMENT PLOTS.

PREMIER

Potato Variety Trial, Nimmitabel.

Premier yielded 6 tons 13 cwt. per acre.

FARMERS' EXPERIMENT PLOTS.

General Remarks.

Successful potato culture is dependent upon the maintenance of soil fertility by crop rotation and, on poor and medium soils, manuring. Adequate attention should also be given to proper cultural methods, seed selection, and the growing of suitable varieties.

In the cooler districts, a practicable rotation is the growth of potatoes and oats, while in the warmer districts maize may also be introduced. All weed growths and stubble should be ploughed under to provide humus, and on the lighter sandy loams the occasional growth of special green manure crops, preferably legumes, is advisable.

It is very important to precede the crop by a winter fallow to conserve moisture, clean the land, and prepare a good seed bed. The land should be ploughed 6 inches or more in depth in June or July, and later reploughed and then harrowed and cultivated before planting. Moderately close planting will, on the average, give the best results, the rows being about 2 feet 6 inches apart, and the sets 16 to 18 inches apart in the rows. The usual depth of planting varies from 4 to 6 inches, and where a good seed-bed has been prepared it is advisable to plant at the latter depth. Harrowing and cultivation after planting should not be neglected. Hilling is required to protect the tubers from the potato moth, and either the cultivator or plough may be used, the latter for preference, where the planting has been shallow.

Seed selection is important, and the seed is best selected in the field while digging from prolific hills which produce good tubers. In any case only clean seed, free from "run out" potatoes, true to type, and of reasonable size should be sown.

The Narrabri Plot.

An experiment plot was also planted on the farm of Mr. W. Palmer, "Pine View," Narrabri, but on account of a very unfavourable spring, it proved a failure. Narrabri is hot and dry in the spring and summer, and unsuitable for the growth of potatoes.

TABLE A.—Showing Results of Variety Trials—Northern Districts.

Name of Experimenter.	Satisfaction				Brownell's Beauty				Manhattan				Queen of the Valley			
	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.
L. M. Rixon, Uralla ...	7	7	2	13	8	12	3	12	6	7	1	26	10	12	1	5
S. Collins, Black Mountain ...	3	12	3	0	4	5	3	0	4	15	0	0	5	11	2	0
Wm. Moore, sen., Guyra... ...	5	18	0	0	5	16	1	0	6	8	0	0	8	0	0	0
T. Farlow, Glen Innes ...	6	2	2	19	4	17	2	14	7	8	1	6	8	15	0	2
J. F. Chick, Tenterfield ...	3	12	1	14	2	7	2	14	3	16	3	0	5	7	2	0
Average yield ...	5	6	2	20	5	4	0	2	5	15	0	12	7	13	1	1
*Percentage yield ...	69·6				67·9				75·1				100			

* As compared with Queen of the Valley = 100 per cent.

TABLE A.—Showing Results of Variety Trials—Northern Districts—*contd.*

Name of Experimenter.	Surprise.				Premier.				Coronation.				Carman No. 1.			
	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.
[illegible]. M. Rixon, Uralla	8	3	0	10	6	9	2	16	8	8	3	20	5	12	2	22
S. Collins, Black Mountain ..	5	3	0	0	4	12	0	0	6	10	1	0	3	7	0	0
Wm. Moore, sen., Guyra... ...	7	8	1	0	9	1	3	18	9	17	1	10	5	14	3	0
T. Farlow, Glen Innes	6	16	1	19	9	8	2	19	10	4	3	3	6	4	2	4
J. F. Chick, Tenterfield	3	7	1	14	2	11	0	0	3	10	3	0	2	4	0	14
Average yield	6	3	2	14	6	8	2	16	7	14	1	18	4	12	2	14
*Percentage yield	80·7				83·9				100·7				60·4			

* As compared with Queen of the Valley = 100 per cent.

TABLE B.—Showing Results of Manurial Trials—Northern Districts.
Variety—Queen of the Valley.

Name of Experimenter.	No Manure				P4.				P5.				P6.			
	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.
L. Rixon, Uralla	9	3	1	19	10	12	1	15	10	8	1	7	10	2	1	19
S. Collins, Black Mountain ...	3	14	1	0	5	11	2	0	4	13	0	0	4	8	0	0
Wm. Moore, sen., Guyra... ...	7	19	2	0	8	0	0	0	8	10	1	0	7	0	0	0
T. Farlow, Glen Innes	8	10	3	5	8	15	0	2	9	0	1	8	8	19	3	9
J. F. Chick, Tenterfield	4	5	2	0	5	7	2	0	6	1	1	0	5	4	1	14
Average yield	6	14	2	22	7	13	1	3	7	14	2	14	7	2	3	20
*Percentage yield	100				113·8				114·8				106·1			

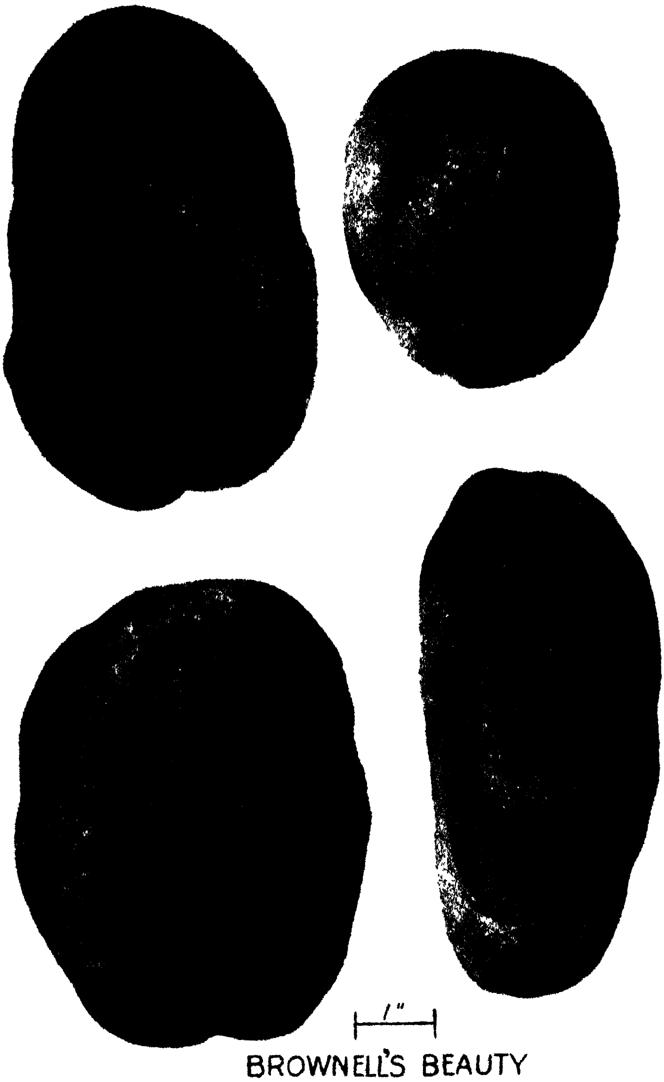
* As compared with no manure 100 per cent.

Western District.

W. R. BIRKS, B.Sc., Inspector of Agriculture.

OWING to the absence of a permanent inspector for the Western District during the early part of last year, only one potato plot was arranged for in addition to the permanent plot at Millthorpe. The former was situated on Mr. F. Barrett's farm, Richmond Hill, on the higher levels of Canoblas, 6 miles distant from Orange. The soil is of a friable basaltic formation, and is representative of the better class potato land in the district.

The ground had not previously been cropped, and was somewhat rough and tussocky, but was submitted to a thorough preparatory fallowing. The first ploughing was completed at the end of July, 1913, and two workings followed during August with disc cultivator and harrow respectively. The land was twice worked in September with the spring-tooth cultivator, and in October harrowed, rolled, and harrowed again. Planting was completed on 15th November, and the plots were harrowed twice early in December as the young plants were showing through.



Potato Variety Trial, Nimmitabel.

Brownell's Beauty yielded 10 tons 14 cwt. per acre.

FARMERS' EXPERIMENT PLOTS.

Potato Variety Trial, Nimmitabel.

Surprise yielded 12 tons 19 cwt. per acre.

FARMERS' EXPERIMENT PLOTS.

Eleven separate plots were planted, in all comprising a trial of varieties (eight sections) and a manurial test (four sections). The sets were hand-dropped behind the plough, and the manure was also distributed by hand in the furrow.

Prior to planting, 8 inches of rain had fallen upon the fallow, which was therefore in fairly good condition as regards moisture. No rain fell, however, for six weeks after planting, and conditions were far from ideal for a good germination; nevertheless a good stand was obtained except in the case of Premier, Carman, and Brownell's Beauty. In the Brownell plot the germination was especially poor, and not more than half the area could be considered planted.

From 25th December to 12th January another dry hot spell was experienced, and on the latter date the crop was "going off" very seriously. The situation was saved, however, by a fall of 3½ inches of rain, and subsequently the season turned out satisfactorily on the whole, allowing of very good late growth.

The total rainfall during the growing period was 15.32 inches, considerably more than was recorded in the less elevated surrounding districts, and eventually a good all round return was harvested, averaging just 8 tons per acre. The crop was late in ripening owing to the mild weather conditions of April and May. Digging was further delayed by frequent rains in June and July, and was not completed until 24th July.

The tubers throughout were clean and of excellent quality and shape, except for a slight second growth in the case of Queen of the Valley and to a less extent of Premier and Carman.

The yields of the several varieties, and those from the manurial trial plots, are set out in the following table, calculated to total yield per acre. Where not otherwise stated, P4 mixture was applied at the rate of 4 cwt. per acre.

TABLE A.—Showing Results, Variety Trial—Western District.

Variety.	Yield per acre. tons	cwt	qrs.
Coronation	10	0	1
Manhattan	9	5	2
Premier	8	13	1
Surprise	8	9	3
Queen of the Valley	8	2	3
Carman No. 1	7	16	2
Satisfaction	6	10	3
Brownell's Beauty	3	16	3

As stated above, the Brownell's Beauty plot germinated very poorly, and the return for this variety was very materially reduced on this account.

TABLE B.—Showing Results, Manurial Trial—Western District.

Variety—Queen of the Valley.

	Yield per acre. tons	cwt.	qrs.
4 cwt. P5 manure per acre	9	5	2
4 cwt. P6 " "	8	19	1
4 cwt. P4 " "	8	2	3
Unmanured	7	6	2

With reference to the trial of manures, it will be seen that the maximum increase, about 2 tons per acre, was given by the P5 mixture, while the lowest, about 1 ton, from P4, is still a payable return. The results from manuring in this case were no doubt less than they might have been owing to the fact that the trial was carried out on virgin country, and the dry conditions at the opening of the season were not conducive to the manure exercising its maximum effect.

Millthorpe.

A. J. PINN, Inspector of Agriculture.

THE variety and manurial plots on the farm of Messrs. Noonan Brothers, Millthorpe, consisted of an area of about 6 acres, the soil of which was the red volcanic, typical of the surrounding country. The potatoes were preceded by a crop of rape, which was sown at the latter end of March, the plot having lain fallow from early February awaiting a fall of rain. The preparation crop did not produce a heavy growth on account of the lateness of sowing. This crop was ploughed under in August, and a second ploughing was given just previous to the planting of the potatoes with a machine-planter in November. Between ploughings the land was kept in condition with the cultivator. The germination of the plot was good except in the case of Surprise and Carman No. 1.

The yields were as follow :—

	Yield per acre. tons	cwt.	qrs.	lb.
Queen of the Valley	3	13	1	10
Coronation	3	10	3	6
Manhattan	3	9	0	22
Carman No. 1	3	3	3	3
Premier	3	0	3	5
Surprise	2	16	1	6
Brownell's Beauty	2	9	3	14
Satisfaction	1	7	3	17

The dry summer seriously affected the yields, more especially the very early ones, as instanced in the case of Satisfaction.

The variety Carman did not germinate well, but the yield per root was good. If there had been a full stand of this variety, it would probably have occupied first place.

Some of the newer varieties which show promise yielded as follows:—

	tons	cwt.	qrs.	lb.
Sussex	3	12	2	0
Mac	3	8	1	0
Wellington	3	0	3	16
Langworthy	2	7	2	8

Sussex is a flat red skin, which has been yielding well in Victoria.

QUEEN OF THE VALLEY

Potato Variety Trial, Nimmitabel.

Queen of the Valley yielded 12 tons 10 cwt. per acre

FARMERS' EXPERIMENT PLOTS.

Wellington, a promising new variety, grown at Nimmitabe..

FARMERS' EXPERIMENT PLOTS.

Mac is a round red skin imported from Scotland, and is of very fine appearance.

Wellington is a dark blue skin, which cuts exceptionally well.

Langworthy is a white variety, of good shape, obtained from England.

The result of the manurial trial was as follows:—

	tons	cwt.	qrs.	lb.
P4 mixture	3	13	1	10
P5 mixture	3	2	2	9
P6 mixture	2	19	2	26
No manure	2	15	3	27

Although the season was a dry one, the effect of the manure could be seen throughout the whole season, except in the case of P6 manure, where the top growth was of similar appearance to that of no manure.

In addition to the variety and manurial trial, an area was devoted to a rotation experiment, which consisted of potatoes following—

(a) A crop of field peas.
(b) A crop of rape.
(c) After long fallow.

Stubble land for the whole experiment was ploughed in February, 1913, and the rape and field peas were sown at the latter end of March, this delay being occasioned through the want of rain.

The crops were ploughed under in August, but the amount of growth was poor.

This experiment will be continued from year to year, but no potatoes will be planted on this section again until November, 1915. The system of cropping will be—preparation crop, potatoes, then hay crop, following on with the same rotation. It will, therefore, be many years before any definite results are obtained.

The yield of the first season plots were as follows:—

		tons	cwt.	qrs.	lb.
After long fallow	P4 manure	3	17	3	21
	P5 manure	3	13	0	19
	No manure	2	15	2	19
After field peas ...	P4 manure	3	9	3	27
	P5 manure	3	0	1	22
	No manure	2	15	2	19
After rape ...	P4 manure	3	3	2	14
	P5 manure	2	18	3	11
	No manure	2	12	1	27

The larger yield of the fallowed area was due, no doubt, to the extra moisture in store, whereas the soil of the rotation plots had been depleted of a quantity of moisture by the growing crops, and as the rainfall up to planting was very meagre, these plots were not able to obtain a full supply.

The whole of the plots at this centre, consisting of about 15 acres, were planted and harvested by machine.

Southern District.

H. C. STENING, Inspector of Agriculture.

POTATO experiments were conducted in the South by the following experimenters:—

Mr. A. J. Rial, Wolseley Park, near Tumbarumba;

Mr. A. E. Herring, Glen Rock, Batlow.

The past summer in the southern districts was most unfavourable for potato crops, there being a decided shortage of summer rain.

From 20th November, 1913, the date of the planting of the Wolseley Park plots, up to 18th March, 1914, only [illegible] points of rain were registered, and at Batlow only 27 points were received for the seven weeks from the end of January to 18th March. From this date till the 27th of the same month good rains fell, and were followed by useful showers in April. These were of benefit to late sown crops, but were too late to be of much service to the early sown, the yields of which were consequently very light.

Cultural Notes.

Wolseley Park.—The soil was a chocolate basaltic loam previously cropped with maize, harvested for green fodder. It was ploughed during the first week in September to a depth of 7 inches, and the surface kept loose until planting time, when it was again ploughed to a depth of 4 inches and the sets were planted and manure distributed by means of a potato planter on 20th November. The sets were dropped every 18 inches, in rows 2½ feet apart. The crops were hilled early in February, and were harvested with a potato digger on 3rd and 4th June.

Batlow.—The soil, which was a virgin basaltic loam, was ploughed in August to a depth of 7 to 8 inches, and the fallow was frequently cultivated. The land was again ploughed on 11th and 12th November, and the sets planted 15 to 18 inches apart after every third furrow, making the rows 2½ feet apart. The crops were subsequently cultivated between the drills.

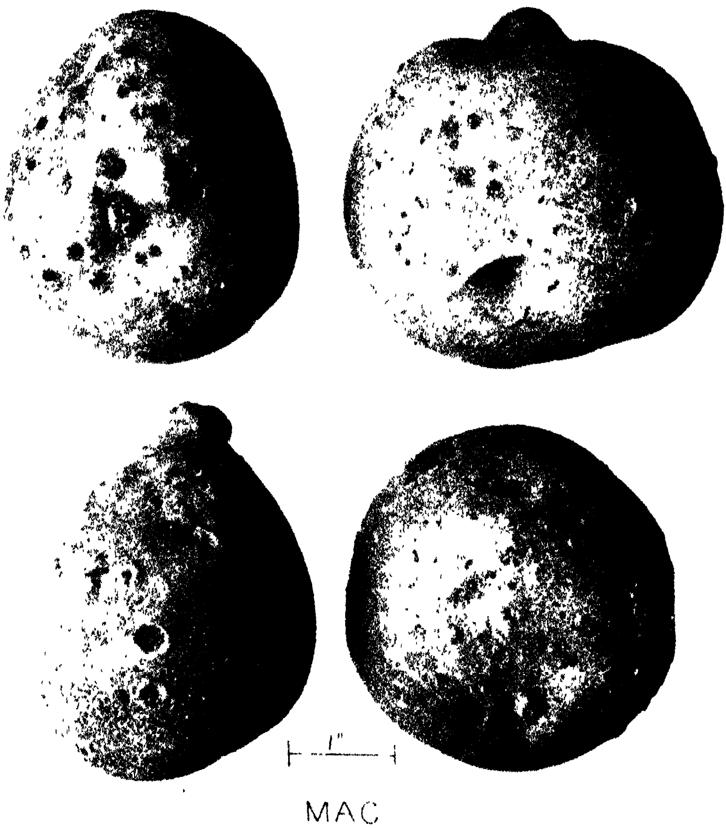
TABLE A.—Showing Results of Variety Trials—Southern District.
(Manured with P4 Potato Fertiliser, at the rate of 4 cwt. per acre.)

Variety	Batlow			Wolseley Park			Average		
	tons	cwt.	qrs.	tons	cwt.	qrs.	tons	cwt.	qrs.
Surprise	3	10	0	3	7	2	3	8	3
Coronation	3	15	2	2	3	[illegible]	2	19	2
Carman No. 1	3	8	1	2	10	3	2	19	2
Premier	3	0	1	2	6	1	2	13	1
Manhattan	2	2	3	2	18	2	2	10	2
Queen of the Valley	2	10	0	2	1	1	2	5	2
Brownell's Beauty	2	1	0	2	[illegible]	2	2	3	3
Satisfaction	2	17	2	1	9	0	2	3	1

LANGWORTHY

Langworthy, a variety new to the Nimmitabel district, showing promise of being very suitable for the Tablelands.

FARMERS' EXPERIMENT PLOTS



Samples of "Mac," a new variety, grown at Millthorpe.

FARMERS' EXPERIMENT PLOTS.

This is the second season in which Surprise has been planted on the experiment plots in the south, and on both occasions it has topped the average yields, and Coronation again occupies second place. Carman No. 1 and Premier, which were tested for the first time, gave a very good account of themselves in the average yields.

The season again proved disadvantageous for the early maturing Satisfaction.

Manurial Experiment.

A test of various fertilising mixtures were carried out with Queen of the Valley at each centre.

At Batlow the manure was spread evenly along the furrows by hand, and at Wolseley Park it was applied through the fertiliser attachment of a potato planter, which distributed the fertiliser very uniformly, and mingled it well with the soil.

TABLE B.—Showing Results of Manurial Trials—Southern District.

Manure.	Batlow.			Wolseley Park.			Average.			Average Increase per acre due to manure.		
	tons	cwt	qrs	tons	cwt	qrs	tons	cwt	qrs	tons	cwt	qrs
No manure	1	15	0	1	3	0	1	9	0			
4 cwt. P4 mixture per acre	2	10	0	2	1	1	2	5	2	0	16	2
4 cwt. P5 mixture ,,	2	8	0	1	9	1	1	18	2	0	11	2
4 cwt. P6 mixture ,,	2	16	3	1	15	0	2	5	3	0	16	3

The increased yields as the result of manuring are much lower than in previous tests, and have scarcely paid for the application. This is due, no doubt, to the lack of sufficient moisture at the right time.

Southern Tablelands.

R. N. MAKIN, Inspector of Agriculture.

POTATO experiments were conducted at four centres on the Southern Tablelands. The names and addresses of the experimenters were as follows:—

- O. E. Silk, Woodbine, Nimmitabel.
- J. Howard, Richlands, Taralga.
- J. Quinn, Stonequarry, Taralga.
- A. Wallace, Jindabyne.

The object of establishing two plots in the Taralga district was to demonstrate the difference in yield of potatoes grown on soils of different formation. The soil on Mr. Quinn's plot was light in character, containing a proportion of ironstone, and had been cropped for a considerable number of years. The plot on Mr. Howard's farm was situated on practically virgin soil of basaltic formation, and was much heavier. Both classes of soils are utilised in this

district for potato-growing, but from the results obtained on the experiment plot the yields are considerably higher on the class of soil represented by Mr. Howard's plot.

The plots at Jindabyne were situated on soil of granitic formation, while the plots at Nimmitabel were planted on heavy dark soil of basaltic origin.

In each case arrangements were made with the experimenters to plough the land several months previous to planting, and to keep it in good tilth by occasional cultivations.

At three centres the manures were applied by hand along the furrow previous to planting the sets, but on Mr. Howard's farm the planting was done with a machine planter, which opens the drill, distributes the manure, drops the sets, and covers in the one operation.

Planting was commenced at Taralga on 11th November, and completed at Jindabyne on the 24th of the same month.

Previous to planting good rains were received, and as a result the germination was satisfactory in all varieties, with the exception of Carman No. 1 and Surprise. From November until March the weather conditions were unfavourable, and the plots experienced a very trying time.

At Nimmitabel the weather conditions were more favourable, as occasional showers were received, and the crop also benefited by the moisture obtained from a heavy fall of snow on 28th January. As a preventive against fungoid attack the crop was sprayed with Bordeaux mixture on 26th February.

A heavy fall of rain was received at the latter end of April when the tubers were nearing maturity, and as the crop was situated on a sloping piece of land the potatoes on the lower level were inundated, with the result that the majority of the tubers rotted.

Varieties.

Carman No. 1.—As previously mentioned, the germination was very disappointing, and taking this fact into consideration the yields from this variety are very satisfactory. It has a white smooth skin, is very prolific, and an excellent cooker. At Nimmitabel many roots were dug carrying over twenty marketable potatoes to the root; this was also the case at Taralga.

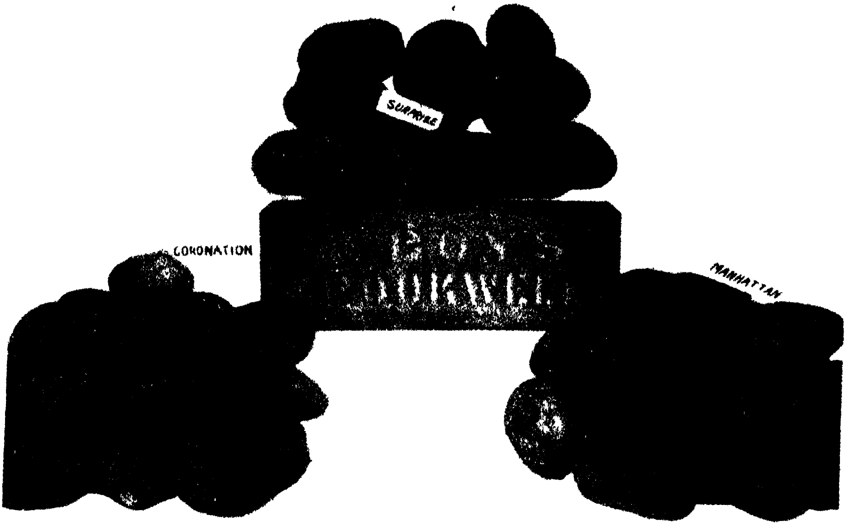
Premier.—This was the latest of all varieties to mature in each of the plots. It is a long, light red skin potato, of nice appearance, but rather susceptible to second growth.

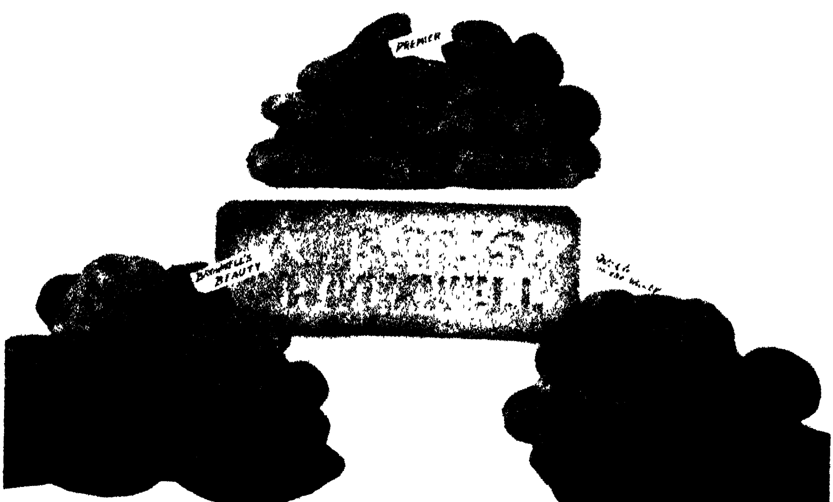
Surprise.—The germination was unsatisfactory on all the plots, due to the size of the seed, which necessitated much cutting. However, it is a potato which apparently suits the Tablelands, and no doubt when more seed is available the variety will be extensively grown.

Manhattan.—A blue-skin potato, which should be known to all farmers. Its habit is to produce practically only marketable tubers. At Nimmitabel this variety yielded over 15 tons per acre, which must be considered exceptional.

Samples of "Sussex," a new variety, grown at Millthorpe.

FARMERS' EXPERIMENT PLOTS.





Potato Variety Trial, Crookwell.

FARMERS' EXPERIMENT PLOTS.

Coronation.—A late blue-skin, somewhat inclined to second growth, but usually a heavy yielder. This variety produced the highest yield at Taralga.

Queen of the Valley.—This variety has again upheld its reputation as a yielder. It is a red-skin, round, somewhat rough, and with apical eyes, somewhat deep. A late maturing variety.

Satisfaction.—Being an early variety, it is more suitable for growing on the coast, but its cultivation on the highlands is recommended on a limited scale for the production of seed for coastal requirements.

Brownell's Beauty.—Seed of a reliable strain of this variety is difficult to obtain, and there is no doubt it is fast losing its reputation as a yielder.

New Varieties.

At Nimmitabel two varieties new to the district were grown on a small scale, viz, Langworthy (a white-skin) and Wellington (a blue skin). Both show promise of being suitable for the Tableland division.

Two imported varieties, Terrequena Negra and Terrequena Blanc, were also grown, but proved of no commercial value.

TABLE A.—Showing Results of Variety Trial—Southern Highlands.

Variety.	O. E. Silk, Nimmitabel.				J. Howard, Taralga.				J. Quinn, Taralga.				A. Wallace, Jindabyne.				A. S. Boys, Crookwell.				Average.			
	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.
Coronation ..	11	8	2	8	7	14	1	4	2	15	3	26	....				7	2	1	10	7	5	1	5
Manhattan ...	15	1	3	4	4	19	2	16	2	0	2	24	....				3	7	3	7	6	7	1	26
Surprise	12	19	0	2	4	14	3	18	1	11	3	6	....				3	18	0	14	5	15	3	24
Queen of Valley ...	12	10	0	4	4	6	1	10	1	14	1	14	3	0	1	12	4	13	1	3	5	4	3	14
Premier	6	13	3	20	5	12	2	0	2	8	0	4	3	3	1	16	5	3	0	18	4	12	0	22
Brownell's Beauty	10	14	1	4	3	5	0	0	1	8	0	4	4	0	0	0	3	11	0	9	4	11	2	20
Carman No. 1 ..	5	19	0	2	2	18	0	24	2	1	2	22	....				3	4	1	4	3	10	3	6
Satisfaction ...	6	4	2	6	3	12	2	0	1	3	1	16	3	3	1	16	1	19	1	17	3	4	2	16

TABLE B.—Showing Results of Manurial Trial—Southern Highlands.

Manure.	O. E. Silk, Nimmitabel.				J. Howard, Taralga.				J. Quinn, Taralga.				A. Wallace, Jindabyne.				A. S. Boys, Crookwell.				Average.			
	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.	t.	c.	q.	lb.
P5 mixture ...	12	13	2	24	4	17	0	26	1	18	0	14	2	2	2	0	5	5	3	14	5	7	1	26
P4 mixture ...	12	10	0	4	4	6	1	10	1	14	1	14	3	0	1	12	4	13	1	3	5	4	3	14
P6 mixture ...	12	10	0	0	3	15	2	4	1	18	3	10	3	13	3	20	4	0	1	12	5	3	2	26
No manure ...	11	1	3	8	4	7	2	10	1	2	0	6	3	2	0	6	3	16	2	3	4	14	0	1

Crookwell.

A. J. PINN, Inspector of Agriculture.

AN experiment was carried out on the farm of Mr. A. S. Boys, Strathroy, Crookwell, which contained an area of about 6 acres. The soil was a medium loam, having previously grown a crop of hay. The land was deeply ploughed

in August and again in October, the planting of the crop being done with a machine planter, and finished on 20th November.

Throughout its growth the crop was kept in a state of good cultivation, and everything was done to preserve the soil mulch.

The germination of all varieties, except Carman and Surprise, was good. The summer was the worst experienced for many years, and at one time it was feared that the whole of the crops in the district would be a total failure. However, good rains fell in March, and as the autumn was extremely mild, and of long duration, crops quickly recovered, and fair yields resulted except in the case of early varieties, which were not benefited to any extent by the late rains.

Samples of tubers grown are illustrated in the two photographs herewith.

Yields of the varieties are included in the Table for the Southern Tablelands, but as a manurial trial, more comprehensive than that included in other plots, was carried out, the results are given herewith:—

	tons	cwt.	qrs.	lb.
P5 mixture	5	5	3	14
Bone, blood, and superphosphate ...	4	15	1	22
P1 mixture	4	13	1	3
Superphosphate	4	12	0	23
Bone and blood	4	3	3	1
P6 mixture	4	0	1	12
No manure	3	16	2	3
Sulphate of potash	3	10	3	3

All manures were applied at the rate of 1 cwt. per acre, except in the case of sulphate of potash, which was applied at the rate of 2 cwt. per acre.

The variety used in the experiment was Queen of the Valley.

The no-manure and sulphate of potash plots appeared the worst throughout the whole year. The phosphatic manures all showed an improvement over the unmanured,

The harvesting of the plots was carried out by using a machine digger.

Illustrations of Varieties of Potatoes.

In the accompanying illustrations of the following varieties—Coronation, Satisfaction, Manhattan, Premier, Brownell's Beauty, Surprise, Queen of the Valley, Wellington, Langworthy, Mac, and Sussex, four views of each variety are presented, viz., one of each side, on edge lengthways, and of one end. This should give a general idea of the characteristic shape and appearance of each variety.

Farmers' Experiment Plots.

MAIZE EXPERIMENTS 1913–14.

Northern and North-western Districts.

F. DITZELL, Assistant Inspector of Agriculture.

MAIZE experiment plots for grain only were conducted in four districts last season, the following being the names and addresses of the experimenters:—

Mr. J. Ditzell, Lansdowne, Inverell.
Mr. J. F. Chick, Hill View, Tenterfield.
Mr. L. M. Rixon, Green Hill, Uralla.
Mr. J. Perry, Killara, Quirindi.

The conditions vary considerably in each district, therefore in this report each plot is dealt with separately; but, as a matter of convenience, the results of all the variety trials are given collectively in Table A, where the varieties in each plot are shown separately in order of merit to enable comparisons to be easily made. The results of the manurial trials are given collectively in Table B.

The Inverell Plots.

Area.—There were eleven plots, each 1 acre in area.

Soil.—This was a rich, black, friable alluvial, which had been under constant cultivation for thirty-six years. The previous crop was maize for grain, and this was lightly manured.

Cultural Details.—The land was ploughed 6 inches deep with a mould-board plough during the latter end of August, and was then allowed to remain in the rough state for about six weeks. After a harrowing about the middle of October, and a cross-ploughing 4 inches deep with a mould-board plough immediately afterwards, it was in excellent condition. This soil has a high humus and lime content, and, therefore, mellows down very well under the influence of the natural agencies. The surface is also a self-mulching one, being always loose and friable, thus preventing undue evaporation of soil moisture. The main thing after an early and deep ploughing is to keep the land clean and free from weeds by using the harrows and the spring-tooth cultivator early in the season while the weeds are young, finally giving a shallow ploughing before planting. These plots were planted on the 13th November, with a maize-dropper, at a depth of 3 to 3½ inches. An average of about 7 lb of seed was sown per acre, and all the plots, excepting one of Funk's Yellow Dent, were manured with 1½ cwt. of M1 per acre. M1 is a complete manure, consisting of 40 per cent. superphosphate, 10 per cent. sulphate of potash, 30 per cent. dried blood, and 20 per cent. bone-dust. The after-cultivation consisted of a disc cultivation in December and another in January, with the running of a single harrow leaf between the rows in February.

Season.—The season was only a fair one for maize. After the first ploughing and before planting, the following rainfall was received:—September, 145 points; October, 289 points; and November, 55 points. The ground was, therefore, nice and moist at planting time, but nevertheless the germination was not altogether satisfactory.

The planting was followed by dry, hot, windy weather, which rapidly dried the ground out to the depth of planting. On the 13th December the blank spaces in some of the plots were replanted with a hoe, in order to secure an even stand in all the plots, and thus enable comparative yields to be obtained. At this time it was noticed that many of the early maize plants were so blown about by the wind, coupled with the hot dry weather, that the surface roots were broken and the plants were lying about and wilting. The rainfall after planting was as follows:—November, 60 points; December, 213 points; January, 564 points; February, 314 points; and March, 512 points. Although the total rainfall was good, the distribution was unsatisfactory. The December rainfall was mainly received during the latter end of the month. January was a good month, but between the 19th January and the 24th February—five weeks—the weather was hot and dry, and during the latter part of this period the maize suffered severely. A heavy hailstorm on 24th February damaged the leaves of the maize considerably. The February rainfall was of very little benefit to the Early Yellow Dent, and the March rainfall came too late for the other varieties.

Results.—Despite the fact that the season was only a fair one, some very good results were obtained, as reference to Table A will show. Leaming (formerly known as Early Leaming, but the "Early" has been dropped, as it was somewhat misleading) was top with 58 bushels 7 lb. per acre, while Cornplanter, Reid's Yellow Dent, Improved Yellow Dent, Funk's Yellow Dent, Riley's Favourite, Early Clarence, and Early Yellow Dent, in this order, all returned yields of over 50 bushels per acre. Taraganda White and Hickory King gave the lowest returns. Early Yellow Dent is recommended as a quick-maturing variety for the Inverell district, especially for early sowing for the production of an early crop to be followed by wheat, or for late sowing on stubble ground, or otherwise; while Funk's Yellow Dent, Reid's Yellow Dent, Improved Yellow Dent, and Leaming, are recommended as main crop varieties. Riley's Favourite and the local large yellow maize (when well selected) also give good results, but on the average the varieties recommended above will give the best results. Early Clarence is a tall-growing, thick-stemmed, late maturing variety, and is therefore not recommended for general cultivation. Cornplanter, Taraganda White, and Hickory King are all white maizes, and of these Cornplanter is recommended in preference to the other two.

In the manurial trial, Table B shows that the unmanured plot returned 40 lb. per acre more than the manured plot. Seasonal peculiarities were partly responsible for this, because the manured plot, though making a slightly more vigorous and early growth, suffered more from the hot and

dry weather experienced in February than did the unmanured plot. Nevertheless, it is not expected that manuring will prove profitable in the rich alluvial soils of this district.

The Tenterfield Plots.

Area.—There were six plots of four-fifths of an acre each.

Soil.—The soil was a sandy loam of blue granite formation, fairly deep and friable, and of medium fertility. The previous crop was sorghum, unmanured, where the Golden Beauty, Leaming, and Early Yellow Dent plots were planted, and potatoes, unmanured, on the land where the Reid's Yellow Dent and the two Funk's Yellow Dent plots were sown.

Cultural Details.—This land was ploughed 6 inches deep with a mould-board plough in July, spring-tooth cultivated early and again late in September, and harrowed immediately, and the portion where the sorghum had previously been was rolled. It was cultivated early in October and again just before planting. These constant cultivations were necessitated by the presence of couch grass. The plots were planted on the 24th October with a maize-dropper, about 2 inches deep in the bottom of furrows 3 inches deep, at the rate of 12 lb. of seed per acre. M1 manure was also sown, except on one plot of Funk's Yellow Dent, at the rate of ¾ cwt. per acre. The after-cultivation consisted of a harrowing before and again after germination, a Planet Junior cultivation in November and another in December.

Season.—The season was somewhat unsatisfactory, the plots being situated in a belt of country which missed most of the summer storms. The rainfall received between ploughing and planting was as follows:—July, 70 points; August, 29 points; September, 224 points; and October, 19 points. The germination was good in all the plots except Reid's Yellow Dent. The rains after planting were—October, 156 points, November, 108 points; December, 219 points; January, 113 points; and February, 210 points. November and December were both hot and somewhat dry, and the maize suffered severely. At Christmas time, although only 30 inches high, many plants in all varieties were commencing to tassel. There were 191 points in March, but this was of no benefit to the crop.

Results.—Dry rot (*Diplodia zeae*) was prevalent in the Tenterfield district, resulting in a lot of mouldy grain. It was also present in the plots to a certain extent, from which all mouldy maize was rejected, so that the results given in Table A are the yields of good saleable maize only. The mouldy maize is unsuitable for market or even stock feed, and when very prevalent it renders the use of the husker and sheller unwise, as the cobs really require husking by hand so that the mouldy ones may be rejected. The disease seems to be much the same on all conditions of soil, and all varieties are attacked, but those with the husks covering the cobs well seem to be the least attacked, the ingress of moisture evidently favouring the disease.

It will be noted that Funk's Yellow Dent and Leaming have topped the yields, followed by Early Yellow Dent, Golden Beauty, and Reid's Yellow Dent. The latter was at a disadvantage on account of a poor germination.

Early Yellow Dent, Funk's Yellow Dent, Reid's Yellow Dent, and Leaming are recommended for the Tenterfield district.

The application of ¾ cwt. of M1 manure per acre, at a cost of 7s. 6d., resulted in an increased yield of 3 bushels 45 lb. per acre (see Table B), which is a profitable increase. On the soils of this district, especially the lighter and older ones, the application of from ¾ to 1 cwt. of a suitable manure—either a complete fertiliser or a mixture of superphosphate and sulphate of potash—is recommended.

The Uralla Plots.

Area.—Six plots, each half an acre in area, were planted.

Soil.—This was a friable, sandy loam of ironstone derivation, patchy and somewhat worked out.

Cultural Details.—In August this land was ploughed 6 inches deep and was reploughed 5 inches deep in October and immediately harrowed. It was afterwards spring-tooth cultivated twice before planting. On the 31st October, the plots were sown at the rate of 10 lb. of seed per acre with a maize dropper 2 inches deep in the bottom of furrows, and all the plots, excepting one of Funk's Yellow Dent, were manured with 1½ cwt. of M1 mixture per acre. The after cultivation consisted of a harrowing in November and a scarifying in December.

Season.—The season was a favourable one for maize. After ploughing and before planting there were 120 points of rain in August, 312 in September, and 190 in October. The germination was fairly good, except in the plots of Reid's Yellow Dent and Hickory King. After planting, 71 points were received in November and 219 in December, while the January and February falls were adequate.

Results.—These were very satisfactory when it is remembered that the ground was old and worn out. Reference to Table A will show that Leaming topped the yields with 32 bushels 28 lb. per acre, and was followed in order by Funk's Yellow Dent, Hickory King, Reid's Yellow Dent, and Early Yellow Dent. The Leaming maize did not mature properly, being soft and damp, while the Hickory King was also a little too late. The other varieties ripened fairly satisfactorily, especially Early Yellow Dent. Leaming, therefore, cannot be recommended for this district, although it is a heavy yielder when it gets a chance to ripen. Hickory King will generally ripen if planted early. Funk's and Reid's Yellow Dent, and especially Early Yellow Dent, are recommended, but should all be planted early to ensure proper ripening. A quick maturing variety is essential in this district. Table B shows an increase of about 6 bushels per acre in favour of manuring.

The Quirindi Plots.

Area.—These consisted of six plots of about ⅓ of an acre each.

Soil.—This was a deep, rich, friable alluvial silt, with an even portion of sandy loam running right across the front of the plots.

Cultural Details and Season.—The land was disc-ploughed 5 inches deep in December, 1912, and again in June, 1913, but as there were only 65

Early Leaming, 17 tons 9 cwt. per acre.

Yellow Dent, 18 tons 13 cwt. per acre.

Maize Green Fodder Trials. Mr. D. W. Baker's Farm, Coramba.

FARMERS' EXPERIMENT PLOTS, 1913-14.

Taraganda White 19 tons 16 cwt. per acre.

Riley's Favourite, 14 tons 10 cwt per acre.

Maize for Fodder [illegible] M. D. W. [illegible]

Farmers' Experiment Plots, 1913-14

points of rain in July and 58 in August, the original intention of planting early in September had to be abandoned. The land was then disc ploughed in September, and spring-tooth cultivated in October, but as there was no rain of any consequence it was considered unwise to plant. The ground was, therefore, neglected during the wheat harvest, and became covered with summer weeds, necessitating re-ploughing early in January. On the 6th January the plots were planted in anticipation of an approaching change in the weather. A maize-dropper deposited the seed at a depth of 2 inches in the bottom of furrows at an average rate of 7 lb. per acre. All the plots, except one of Funk's Yellow Dent, were manured with 1½ cwt. of M1 per acre. Sufficient rain did not fall after planting to ensure a germination right through the plots, but on about half of each plot, where the soil was a sandy loam, the germination was fair, and this portion, amounting to ⅛ of an acre in each plot, was harvested. The after cultivation consisted of two harrowings and one cultivation. The following rains were received after planting:—January, 333 points (latter end of month); February, 226 points; March, 391 points; and April, 142 points. The April rain was only of partial benefit to the plots.

Results.—The Leaming and Hickory King did not mature sufficiently to be worth harvesting, but the Funk's and Reid's Yellow Dent were fairly ripe, while the Early Yellow Dent ripened properly. The yields obtained are given in Table A. Funk's Yellow Dent was highest with 32 bushels 13 lb. per acre. The summers at Quirindi are generally hot, and fairly dry, and it is therefore not a safe maize-growing district. Small areas, however, are grown in various parts of the district, and for these quick-maturing varieties are recommended, such as Early Yellow Dent. Funk's and Reid's Yellow Dent are also fairly suitable. Leaming is a heavy yielding variety in good seasons. If the spring is favourable, September is suitable for planting, while for later sowing December is recommended.

Reference to Table B will show that manuring resulted in a highly payable increase of nearly 9 bushels per acre. The manured plot matured earlier than the unmanured plot, and, therefore, had a considerable advantage.

General Conclusions.

Successful maize culture is dependent upon a proper rotation system and rational manuring, correct cultivation of the land before and after planting, attention to planting details, the use of suitable varieties, and seed selection.

Suitable rotations will vary in the different districts, but broadly outlined will include the growth of various winter crops and summer crops in addition to maize, together with the introduction of a legume where possible. Rational manuring means the application of the most suitable fertiliser where such is profitable, but on the poorer soils especially it must always be remembered that even if only a small profit is obtained from manuring, the practice will be justified by preventing rapid soil exhaustion.

Land intended for maize should be ploughed as early in the winter as possible, preferably in June or July, and to a depth of 6 inches, and then, by surface cultivation and shallow ploughing, weed growth should be checked,

moisture conserved, and a good seed bed prepared. After-cultivation is necessary to keep the maize clean and prevent undue evaporation of soil moisture. The cultivation should not be too deep, as such would injure the maize roots. The cultivation may be deeper early in the season than later on.

In New England the rows should be about 4 feet apart, and in the Inverell and Quirindi district from 4 feet 6 inches to 5 feet, or even more, apart, the wider rows on the richer soils. About 8 lb. per acre of average-sized seed in the Inverell and Quirindi districts, and 10 lb. in New England, provided the seed is good, is sufficient. When the seed is large these amounts should be increased.

TABLE A.—Showing Results of Variety Trials—Northern and North-western Districts.

J. Ditzell, Inverell				J. F. Chuck, Tenterfield			
Order of Merit.	Variety.	Yield per acre.		Order of Merit.	Variety.	Yield per acre.	
		bus.	lb.			bus.	lb.
1	Leaming	58	7	1	Funk's Yellow Dent ..	23	18
2	Cornplanter	53	47	2	Leaming..	22	5
3	Reid's Yellow Dent ..	53	42	3	Early Yellow Dent	19	45
4	Improved Yellow Dent	52	44	4	Golden Beauty ..	18	46
5	Funk's Yellow Dent ...	52	28	5	Reid's Yellow Dent .	15	0
6	Riley's Favourite ...	51	44				
7	Early Clarence	50	50				
8	Early Yellow Dent ...	50	42				
9	Taraganda White ..	46	4				
10	Hickory King	39	26				

L. M. Rixon, Uralla				J. Perry, Quirindi			
Order of Merit.	Variety.	Yield per acre.		Order of Merit.	Variety.	Yield per acre.	
		bus.	lb.			bus.	lb.
1	Leaming...	32	28	1	Funk's Yellow Dent ..	32	13
2	Funk's Yellow Dent ..	25	40	2	Early Yellow Dent ...	21	53
3	Hickory King	23	32	3	Reid's Yellow Dent .	21	13
4	Reid's Yellow Dent ...	22	38				
5	Early Yellow Dent ...	21	51				

TABLE B.—Showing Results of Manurial Trials—Northern and North-western Districts.

Name of Experimenter.	Funk's Yellow Dent 1½ cwt. M1 per acre.		Funk's Yellow Dent – Unmanured.		Increase due to Manuring.		Decrease due to Manuring.	
	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.
J. Ditzell, Inverell	52	28	53	12	....		0	40
J. F. Chuck, Tenterfield* ...	23	18	19	29	3	45	....	
L. M. Rixon, Uralla... ...	25	40	19	40	5	50	....	
J. Perry, Quirindi	32	13	23	20	8	49	....	

* Only ¾ cwt. M1 per acre.

General view of Maize (Grain) Trials.
Mr. J. Wilson's Farm, Coramba.

Yellow Dent, 90 bus. 39 lb. per acre.
Maize (Grain) Trials. Mr. J. Wilson's Farm, Coramba.

FARMERS' EXPERIMENT PLOTS, 1913-14.

Southern District.

H. C. STENING, Inspector of Agriculture.

Summer Fodder Experiments.

EXPERIMENTS with maize and sorghum for fodder purposes were conducted during the past season on the property of Mr. A. J. Rial, of Wolseley Park, near Tumbarumba. The soil, which was a chocolate loam, was ploughed the first week in September, harrowed a month later, and prior to sowing on 14th November, was scarified. The seed was sown in drills 35 inches apart, with a 15-hoe wheat drill, feeding through three tubes only.

The maize was sown at the rate of 20 lb seed per acre and the sorghum at the rate of 8 lb per acre. Fertiliser was applied at the same time through all tubes of the drill. The growing crops were subsequently cultivated between the rows.

The season was most unfavourable, the rainfall for the total period of growth of the crops being only 243 points, distributed as follows —

Month	Points.
November (from 14th)	7
December . . .	153
January	41
February	42
March (to 18th)	0
Total ..	243 points.

Owing to the liability to late and early frosts, the growing season for summer crops at Wolseley Park is necessarily a short one, and although the crops had not reached the stage of maturity when the total weight of produce is greatest, viz., when the grain is "glazed," it was decided to harvest the crops on 18th March, so as not to risk the danger of frosts. This date proved none too early, for the crops were cut by frost on the very morning of harvesting. Thus the yields were reduced owing to the withering of the flag.

The yields of the variety trials were as follow —

TABLE A.—Showing Results of Variety Trials—Southern District. Manured with Superphosphate at the rate of 1 cwt. per acre.

Variety.	Yields per acre.		
	tons	cwt.	qrs.
Maize.—Early Leaming	5	7	3
Yellow Dent	4	11	3
Eureka	4	6	3
Taraganda White	4	6	2
Riley's Favourite . ..	3	17	1
Early Yellow Dent	3	1	0
Hickory King	2	1	1
Sorghum.—Early Amber Cane ...	4	6	1
Planter's Friend	4	2	2

Early Leaming, which returned the highest yield, also gave the heaviest return in the trials conducted the previous season under more favourable conditions, which goes to demonstrate the superiority of this variety as a consistent yielder under all conditions.

Early Yellow Dent, being the earliest of the varieties, had reached a stage of maturity when harvested, but the total fodder produced was small; it can in no way be regarded as a fodder maize.

The low return of Hickory King was due to poor germination, no doubt owing to the fact that, as the seed of this variety was very large, it was somewhat damaged in passing through the feeders of the wheat-drill.

It is the general opinion that sorghum will withstand dry conditions better than maize, so it comes rather as a surprise to find that this season it has been outyielded by the maize. Although the sorghum crops appeared very green and succulent, and stooled well, they made very slow growth, and at the time of harvesting were only about half the height of the maize crops and had only just headed.

Manurial Experiment.

A test was made with various mixtures and quantities of manure. Early Leaming was the variety used throughout, and the results were as follow:—

TABLE B.—Showing Results of Manurial Trial—Southern District.

Manure per acre.		Yield per acre.			Increase per acre due to manure.		
		tons	cwt.	qrs.	tons	cwt.	qrs.
No manure		4	14	2	....		
1½ cwt. M1, consisting of	superphosphate 67⅛ lb. dried blood 50⅜ lb. bone-dust 33⅝ lb. sulphate of potash 16⅞ lb.	5	1	0	0	6	2
1 cwt. superphosphate		5	7	3	0	13	1
2 cwt. superphosphate		6	1	1	1	6	3
1¼ cwt. P5, consisting of	superphosphate 1 cwt. sulphate of potash ¼ cwt.	5	17	0	1	2	2
1½ cwt. M5, consisting of	superphosphate 1 cwt. sulphate of ammonia ½ cwt.	5	10	1	0	15	3

The most interesting feature of this test is the increased return as the result of applications of superphosphate. The yields have increased almost in proportion to the amount of superphosphate applied, and which would indicate that still heavier dressings of superphosphate would probably give a further profitable increase. Slight increases have resulted from the addition

of potassic and nitrogenous manures to the superphosphate, viz., 9 cwt. and 2½ cwt. respectively. As the soil was virgin it was scarcely to be expected than an application of nitrogenous manure would prove of much advantage.

Conclusions.

On a rainfall of less than 2½ inches during the growing period, a yield of 5 tons per acre of fodder may be regarded as very satisfactory, and in such a season, when there is little or no natural pasture available, this would be of far greater value than much heavier yields in a favourable season. Dairymen would be wise always to anticipate a dry season and sow a sufficient area with fodder crops to maintain the milk production over such periods. Then, should the season result favourably, any surplus fodder can well be conserved in the form of silage.

One of the sweet uses of adversity during the past dry summer is to teach the value of giving the land a fallow of two or three months prior to sowing the maize, and of sowing it in drills. By adopting this system the winter rains are stored up for the crop and the escape of moisture during the hot dry weather prevented by keeping the surface soil loose by cultivating between the drills. Many broadcasted crops were seen last season which were only about 2 feet high, and not worth cutting.

Murrumbidgee Irrigation Area.

R. W. McDIARMID, Assistant Inspector of Agriculture.

The experiments conducted during the past season with maize on the irrigation areas of Yanco and Mirrool consisted of:—

Green Fodder Variety Trials.
Variety Trials for Grain.
Manurial Trials.

They were conducted on the following farms:—

A. Lockwood ...	... Farm 57 ...	Yanco Area.
P. Gersbach ...	... „ 330 ...	„
G. Puho ...	... „ 522 ...	„
A. McLoone ...	... „ 285 ...	„
D. Piart ...	... „ 349 ...	„
J. H. O'Brien ...	... „ 354 ...	„
L. Sutton ...	... „ 40 ...	Mirrool.

Green Fodder Trials.

These included varieties of maize and sorghum sown with different manures. The seed was platned early in February. The maximum amount of growth was made at Mirrool by the end of May, but at Yanco the varieties had not fully developed by the middle of June, when frosts appeared. They might, with advantage, be sown earlier in future.

The following table shows the average yields :—

TABLE A.—Showing Results of Green Fodder Trials—Murrumbidgee Irrigation Area.

Crop and Variety.	Manure.	Quantity per acre.	Farm 40.	Farm 354.
		cwt.	t. c. q. lb.	t. c. q. lb.
Maize.—				
Taraganda White	M5	1½	6 5 0 0	5 3 0 0
" "	Nil.	..	4 0 1 12	3 11 0 0
" "	P5	1¼	4 9 1 4	......
" "	M1	1½	3 11 1 20	5 7 0 0
Eureka	M1	1½	6 5 0 0	3 11 0 0
Leaming	M1	1½	14 5 3 24	4 8 0 0
Improved Yellow Dent	M1	1½	11 3 0 24	6 10 0 0
African Standard	M1	1½	8 13 0 24	......
Sorghum.—				
Early Amber Cane	M1	1½	6 5 0 0	3 2 2 0
Planter's Friend	M1	1½	8 0 2 21	... ..
" "	Nil.	...	6 1 1 24	... ..
Sorghum Saccharatum	M1	1½	4 18 0 24	......
" "	Nil.	...	4 9 1 4	......

The higher yields on Farm 40 (Mirrool) were due to the superior soil.

On the "Crab-holes" on Farm 354 the growth was much more prolific than elsewhere.

Maize for Grain.

These consisted of variety and manurial trials and were sown on various classes of soil over the area.

The seed was planted during the third week in December to enable the grain to fertilise properly during the cooler months of the autumn than would have been the case with sowing in early spring.

The adoption of a wrong season of sowing, together with lack of knowledge of varieties most suited to the particular conditions and proper methods of cultivation, accounted for the previous failure with maize on the area.

The early maturing varieties, such as the Dents and Boone County, will be the best to grow in the future, and with less water and better cultivation payable crops will be produced for consumption on the farm.

The common practice of flooding the crop without cultivation cannot be too strongly condemned.

The following table gives the individual yields on each farm :—

TABLE B.—Showing Results of Grain Trials—Murrumbidgee Irrigation Area.

Variety.	Manure.	Quantity per Acre.	Farm 330.	Farm 349.	Farm 522.	*Farm 285.	Farm 57.
		cwt.	bus lb.	bus. lb.	bus. lb	bus. lb.	bus. lb.
Hickory King	M1	1½	52 0	26 12	45 0	..	...
" "	Nil.	......	59 44	10 40	41 0	139 16	...
" "	M5	1½	...	37 0	47 30	...	...
" "	P5	1¼	...	34 40	50 42	...	...
Leaming	M1	1½	52 28	39 8	46 0	...	50 50
"	M5	1½	...	...	...	...	48 27
"	Nil.	......	...	...	...	46 16	40 40
"	M5 Top-dressing.	1½	...	...	...	...	51 33
Cornplanter	M1	1½	...	36 0	61 42	...	...
Boone County	M1	1½	45 0	...	...		...
" "	M5	1½	...	...	...	98	...
" "	Nil.	......	...	...	...		...
Reid's Yellow Dent	M1	1½	52 16	25 28	56 14	..	...
" "	Nil.	......	...	...	...	113 12	...
Early Yellow Dent	M1	1½	...	36 20	50 0	...	...
" "	Nil.	......	...	...	..	94 18	...
Funk's Yellow Dent ..	M1	1½	51 0	34 32	64 14	..	...
" "	Nil.	......	...	...	...	90 20	...

* The yields at Farm 285 are very high and only taken from a very small area, excepting Boone County Special, which was one-third of an acre in extent.

In each case the application of fertilisers was successful, excepting in the case of the plot at Farm 330 where the outside plot, which had been manured, was affected considerably by hot winds.

Watering and Cultivation Details.

The following table gives the details of watering in each case.

Location.	Sown.	1st Watering.	2nd Watering	3rd Watering.	4th Watering	5th Watering	6th Watering.
Farm 57... ..	17/12/13	6/1/14	16/1/14	31/1/14	15/2/14	2/3/14	17/3/14
Farm 349... ...	24/12/13	30/12/13	14/1/14	29/1/14	13/2/14	28/2/14	15/3/14
Farm 522	23/12/13	3/1/14	16/1/14	31/1/14	15/2/14	17/3/14	14/4/14
Farm 330... ..	19/12/13	8/1/14	25/1/14	7/2/14	21/2/14	23/3/14	......
Farm 285... ..	18/12/13	30/1/13	8/2/14	16/3/14	......	......	......

At each farm the land was cultivated as soon as possible after each irrigation until the maize had made too much growth to continue.

This table indicates that the best average yields were obtained where least water had been used, but the nature of the soil must also be borne in mind, for at these two farms the soil is much more friable and suitable for irrigation than at the other farms.

The following descriptions of the soil require to be noted :—

The soil of Farm 285 is a light friable loam on the edge of a box swamp. The water enters freely and the land cultivates well after watering.

The soil at Farm 330 is of a sandy to sandy loam which is easy to irrigate and cultivate.

The soil at Farms 57, 349, and 522 is very similar, being in each case of a clayey nature.

Rainfall.

The following rainfall has been recorded at the Yanco Experiment Farm, and was likely to be useful to the crop.

January, 1914	... ...	4 points.
February	... ...	42 „
March	... ...	205 „
April	... ...	72 „

The rain that fell after the end of April was not likely to benefit the crop to any degree, as the grain was too far advanced.

Remarks.

The methods of sowing the grain varied at the different farms; but where the best results have been obtained the method adopted may have influenced the crop considerably. The drills were opened and watered, and when dry enough, but still moist, the grains dropped in by hand, covered with a hoe and finally harrowed. This placed the grain in warm, moist soil, which ensured rapid and thorough germination.

The top-dressing experiment on Farm 57 with M5 mixture indicates the possible advantage of top-dressing maize prior to cobbing. In this case it was done six weeks after sowing the seed. If the crop is fertilised lightly at sowing time and top-dressed just prior to cobbing, with the cultivation and irrigation following, a further increase may quite possibly be obtained.

Lime as a Preservative of Eggs.

In reply to a correspondent, the Poultry Expert furnished the following information with regard to the use of lime for the preservation of eggs.

> Slack 4 parts of freshly burnt lime in 20 parts of water, to which has been added 1 part of salt. Stir well together and allow to stand for a few days; then pour off the liquid. It should be noted that the measurements are to be taken by quantity, not by weight. The lime-water is then poured into wooden or earthenware vessels, as lime will rust iron whether the latter be galvanised or not. The eggs are then placed in the vessels, which should be stored in a cool place.

The Poultry Expert, however, is of opinion that lime is not a very satisfactory preservative for eggs, and states that in any case it is effective only for a short period. He would not recommend its use in our warm climate, water-glass (silicate of soda) being much better for the purpose.

Explosives in Agriculture.

H. C. COGGINS.*

BEFORE dealing with the various methods by which explosives may be applied to agriculture, it may, perhaps, be advisable to say a few words regarding the explosive to be used, because, if the man on the land intends using them, it is just as well for him to know something about the explosive he is handling. Accidents may and do occur, simply through ignorance; and, unfortunately, if an accident does happen, it is usually too late to say, "I'll know better next time!"

There are several kinds of explosives on the market at the present time, and of these the writer prefers gelignite, for many reasons. It is cheap, easily handled, convenient in size, and comparatively safe, for the reason that the State Explosives Department very carefully tests all gelignite before allowing it to be landed. If the slightest sign of exudation is found, the shipment is taken outside Sydney Heads and dropped overboard.

Handling Frozen Gelignite.

One important fact should be borne in mind, and that is, should gelignite become frozen, which very rarely happens in this State, it is not advisable to handle it. This frozen condition can easily be detected by its hardness, as gelignite is normally soft and pliable to the touch.

It should be thawed carefully, and the best and simplest way to do this, without going to the expense of a "warming" pan, is to place the gelignite in an empty "billy," and, putting the lid on, place the billy in a bucket of hot water for about ten minutes. On examination the gelignite will be found to have thawed and regained its normal condition. Under no circumstances should it be placed near a fire or in an oven; both are dangerous.

There are plenty of men who consider there is an element of danger in the use of explosives. There is just the same risk in the use of a gun. If the same care in using explosives be taken as in handling a gun under average conditions, there is practically no danger.

Until recently farmers were averse to applying explosives to land clearing, subsoiling, &c., but the prejudice and nervous feeling in regard to handling explosives is becoming a thing of the past; and in practically every district in the State men are using it when necessary, just as freely as they do the plough.

Land Clearing.

The cost entailed in clearing is always considerable, and this bears still more hardly on the new settler, who has nothing "coming in." It is often the cost that prevents a man from clearing and cultivating much of his holding.

* Late Assistant Inspector, Department of Agriculture.

Where timber is easily burnt, the matter presents little difficulty. Box, brigalow, belar, and some other timbers burn right out, and explosives are not necessary, and in such areas clearing is a small item; but where we find red gum, white gum, flooded gum, mahogany, peppermint, messmate, and other timbers hard to burn, it is a question of what it is going to cost.

In many instances a man buys a property after the timber has been sold, and he is left with a legacy of stumps to dispose of. This is a case where explosives may be used to advantage both as regards time and cost. In all the demonstrations conducted by the writer when getting to work on a stump, which, by the way, is selected for him, and is generally the "pet" of the paddock—it is his custom to ask what would be the cost of grubbing this particular stump, and how long it would take. The estimate is given by practical men, and in every case the stump is blown out for half the estimated cost, and where it would, for instance, take a man a full day to grub a stump, gelignite has done it in half an hour, which means that one man can do about sixteen stumps a day without working particularly hard.

A further advantage over grubbing is that when a stump is grubbed it has to be disposed of, and probably it is difficult to burn, and is in one piece. With explosives the stump is generally blown out in at least five or six pieces, and these can be handled with ease. Again, when a stump is grubbed, the roots have to be "run," whereas with explosives and a little experience there is no necessity to do this, as it is done by the gelignite.

The same remarks which apply to stumps apply equally to trees, for here again explosives have the advantage as regards cost, time, and work. Of course, this does not apply to the smaller trees, which can be pulled down; what is meant is heavy timber, from 3 feet in diameter upwards. If the tree is grubbed it still has to be disposed of, and if not burnt this means a lot of sawing, whereas with explosives, when the tree is down, by putting in a plug here and there along the trunk, the whole tree is easily shattered, a very handy thing when it fails to burn easily.

When using explosives for land clearing an eye must be kept on the cost. It is worse than foolish to indulge in spectacular displays in the shape of blowing a tree to pieces as it stands. That sort of thing costs money, and there is no necessity to blow parts of stumps fifty or a hundred yards away. It can be done, certainly, but at too great a cost. After a little experience one will be able to gauge how much gelignite is required. The particular sound of the "report," and the size of the hole, and the distance the timber is thrown, will all act as a guide.

With regard to very heavy timber, it is not advisable to blow it out. It is too costly, and a far cheaper method is to shatter and burn. Nearly all timbers will burn well if shattered properly. In Fig. 1 it will be seen that a charge is placed in the trunk as well as under the tree. The result of the explosion will show that a cavity is made under the tree, where the fire may be started, and the trunk is gashed in many places. By this method the fire will save outlay in explosives.

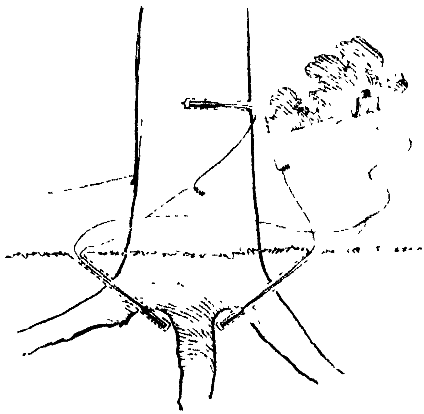


Fig. 1.—Showing position of charges for shattering and burning heavy timber.

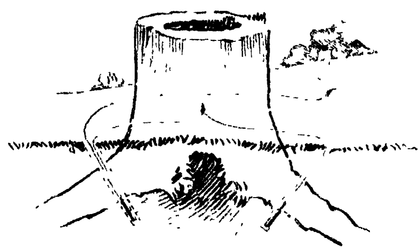


Fig. 2.—Position of charges for treating hollow trees and stumps.
Note that the charges are placed under sound wood and not under the hollow centre.

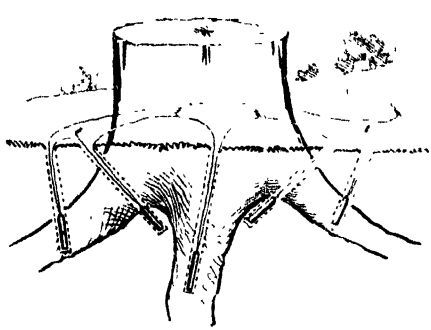


Fig. 3.—Position of charges for treating sound stumps with taproot.
This system enables the tapwood to be cut clear of the ploughing depth.

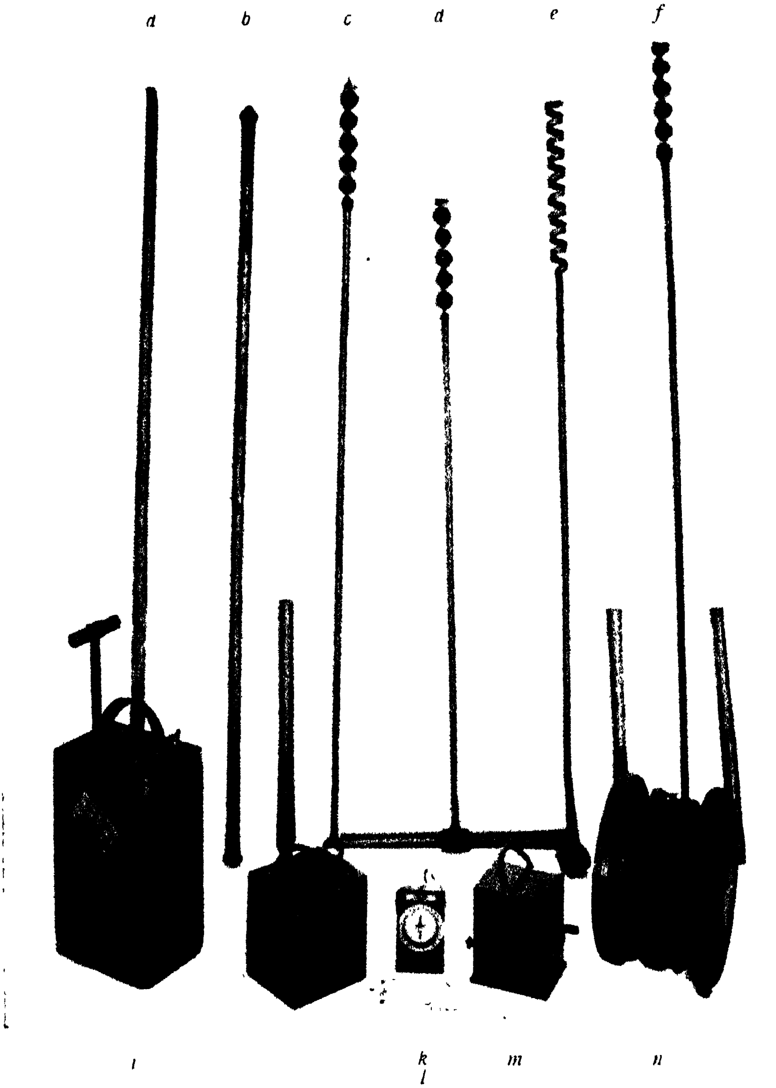


Fig. 4.—The necessary outfit for land-clearing by explosives with an electric battery.

(*a*) Tamping rod.
(*b*) Punch bar.
(*c*) Wood auger (Matheson).
(*d*) Earth auger (short)
(*e*) Wood auger (Bull-nose).
(*f*) Earth auger (long).
(*h*) Handles for augers.
(*i*) Rack-bar exploder (Magneto).
(*j*) Q 1 exploder.
(*k*) Galvanometer for testing electric detonators, cable, and charge when ready for firing.
(*l*) Crimpers.
(*m*) Q exploder.
(*n*) Firing cable.

EXPLOSIVES IN AGRICULTURE.

Green timber may also be treated this way, and frequently, in the case of timbers hard to burn, will burn better half dead.

With regard to green stumps, owing to the vitality of the roots and the consequent hold they have on the ground, it will be found that fully 25 per cent. more gelignite will be necessary than in the case of a dead stump of the same size.

In all operations of land clearing, whether it be stumps or trees, either for blowing right out or for shattering and burning, it is necessary to use a battery, cable, and electric detonators. There certainly are instances where small stumps and trees can be got rid of by using the tape fuse instead of the battery, but where there is a tap-root or the timber is at all heavy, it is impossible to get satisfactory results, and the operation entails much more cost.

A most important fact to remember is that resistance is everything to the explosive, and quite a number of men forget this fact. For instance, it is a waste of explosive to place a charge directly under a tree that has a "pipe" through it. It stands to reason that, as the explosive makes for the line of least resistance, the charge, instead of doing its work, escapes up the pipe and is entirely lost. Therefore we must, so to speak, harness our charge, and see that every plug put in has plenty of resistance.

To blow out hollow stumps or trees, omit the charge directly under the tree, but place the charges as shown in Fig. 2. There the resistance is utilised, with the desired effect.

Should the stump be sound and have no tap-root, the main charge should be placed directly under the stump; if there is a tap-root, insert a good charge on both sides of it and a smaller one into it. The result will be that the two side charges do the lifting, and the charge in the tap-roots cuts it off. (See Fig. 3.)

Where large lateral roots exist, which dip away from the surface, it is wise not to depend on the "lifting" charges, as mentioned above, to do all the work. These roots are very powerful, as generally in such cases it may mean no tap-root. Endeavours should be made to strike these roots with the auger below the ploughing level, and insert a small charge. The result will be that these roots will be cut at this point, and not only will it greatly aid the main charges, but will save a lot of "pruning." (Note the treatment given to the lateral roots in Fig. 3.)

When one commences land-clearing with explosives, it will be found that the first stump or two costs somewhat more than it should. This is due to the fact that a beginner generally makes the charges too big, but the fault is soon corrected as the work progresses.

The depth at which the charges should be placed will vary with the character of the subsoil and the rooting system. Generally speaking, the main charges should be from 2 feet 6 inches to 3 feet 6 inches. If the charges are too shallow, failure will follow; and if too deep, too much cavity will result. Experience will guide one as to the required depth, but if there is a hard clay subsoil, or an equivalent, for the shot to "kick off" from, the holes need not be so deep; whereas if the soil is sandy and deep, the charges will have to go deeper to secure the resistance.

Avoid boring down alongside a root, such as a "hip" or lateral root. Go into it or under it, otherwise the power is lost.

It may be found that the land is full of small stones, and the auger is useless. In such a case, punch the holes down with a bar. Keep a small three-cornered file handy, to touch up the augers occasionally. The whole outfit is shown in Fig. 4. The augers, with the exception of the bull-nosed auger, are of the ordinary Matheson type, with the points cut off of those required for earth work. The total cost of the necessary tools, battery, &c., is about £6 10s. It will be noticed that three batteries are shown in the plate. This is merely to show the varieties, which are known as Q, Q 1, and the Rackbar exploders. The prices are £2, £2 10s., and £3 respectively. For ordinary clearing, the smallest battery will be found strong enough, as it will fire about ten shots. Where it is the intention to treat several stumps at once, the large battery will be necessary.

The following is a summary of the most important points, the observance of which may save a lot of trouble:--

(1.) When at work keep children and dogs away; they both want watching, and it is impossible to do two things at once.

(2.) Keep the gelignite in a shady spot while working.

(3.) When making the "primer," take only one electric detonator out of the bundle at a time.

(4.) Test both the firing cable and detonators with the galvanometer before using.

(5.) In the event of getting a short circuit, after previously testing the cable and detonators and finding them satisfactory, look to the wires. The fault may be there, either by the exposed ends being on the ground (they should, after being twisted, be hung up), or a wire of one of the primers may have been damaged in tamping, or they may not have been twisted together properly. If nothing wrong can be found, go back to the end of the cable, and put the two wires of the cable on to the galvanometer. If the hand on the dial still remains quiet, the best plan is to go back to the stump and "drop" one charge. That is to say, if there are four holes connect the wires as if there were only three, and test again. The faulty place may possibly be found at once. If not, disconnect again, and treat as if only two holes, and so on. This sort of thing very seldom occurs, but when it does it is very annoying.

(6.) Always put the cable out towards the sun, so that when you fire your back is to the sun, thus enabling you to keep an eye on flying timber.

(7.) Disconnect the battery as soon as the shot is fired. The battery is a magneto, not a dry cell.

Better results are obtained when the subsoil is in a hard dry state, as the resistance is greater, and the ground for some distance round is benefited. Poor results are obtained if operations are carried on when the ground is soft, as the ground is only "pugged," a result detrimental to its physical condition.

(To be continued.)

Fifth Annual Report of the Demonstration Area, Bathurst Experiment Farm, 1913.

R. W. PEACOCK, Manager.

A SUBSTANTIAL profit, the highest yet obtained, is shown in the report for the past year. The profits for the past five years are as follow:—

Year.		Per acre. £	s.	d.
1909	... ...	1	8	8¼
1910	... ...	1	3	3
1911	... ...	1	18	3
1912	... ...	0	13	10
1913	... ...	2	4	4

The average profit for the five years is £1 9s. 8d. per acre. This, taken into consideration with the prices a farmer would receive for the work done, is ample testimony of the soundness of the farm practice followed to ensure such results. After a period of five years, throughout which the average rainfall has been below the average, it is not premature to draw attention to this fact.

The excessive prices of bags for grain and chaff as compared with previous years proved a very serious tax.

Owing to the high cost of the various operations, farmers are reminded of the necessity of giving attention to labour-saving methods.

The high prices ruling during the last few years for both hay and straw drew attention to profits from such, when the farm is conveniently situated as to rail and markets.

The larger proportion of Algerian oats used in the fodder crops and main cereal crops is largely due to the desire to keep in check such diseases as Take-all and Flag Smut. It is fortunate that such a profitable cereal can be used as a change crop.

During the season good returns have been obtained from the fodder crops, and it would appear that it requires sufficient growth to graze 3·6 sheep per acre for five months to reimburse the cost of producing the fodder crops. Any balance of fodder and the benefit accruing from the grazing of sheep by the destruction of weeds, their excreta, and the allowing of seasonable fallowing operations, combine to prove of considerable value not to be directly represented in £ s. d.

The results have been submitted in two different ways No. 1 showing cost of operations and actual receipts, the profit being £2 4s. 4d. per acre; No. 2 showing the cost of operations and the prices which could have been obtained by the ordinary farmer for his produce, the profit in this case being £1 6s. 4d. per acre.

It will be noticed that the costs of operations are high, in fact, higher than they would cost the average farmer. No attempt has been made to inflate the credit balances.

The costs are upon the same basis as in last year's report, which were higher than during previous years, owing to higher wages and more expensive horse fodder. The fodder crop values are based upon 12s. being the earning power of a ewe as during last year, and owing to the high values for wool and mutton, this is decidedly below what could be obtained.

The detailed statement of the various operations plainly shows the farm practice, varieties used, dates of sowing, seed per acre, &c.

The area was not kept strictly for the varieties of proved merit, but owing to the demand for seed of other varieties by the Department and farmers, several were grown which in some measure reduced the yield.

A tabulated statement of costs is given. The costs of stooking, carting, and stacking are varied somewhat in relation to the size of crop, but in no case were they less than in the statement.

A full statement with regard to the farm practice, rotation, short fallow, alternating fodder crop, plant diseases, rainfall, manuring, general results, varieties, features of the season, and the treatment and yield of the crops, was published in the May issue, to which readers are referred.

TABLE INDICATING COSTS OF THE VARIOUS OPERATIONS, &C.

Six-inch ploughing	8s. per acre.
Four-inch ploughing	4s. 6d. per acre.
Drilling...	2s. 3d. ,,
Seed wheat	6s. per bushel.
Seed barley	5s. ,,
Seed oats	3s 6d. per bushel.
Seed rape	4d. per lb.
Superphosphate (price under contract) ..	£4 5s. per ton.
Superphosphate (price paid by farmer) ...	£4 10s. per ton.
Cutting with binder	4s. per acre.
Twine	1s. 6d. per acre.
Stooking	1s. 9d. to 2s. 6d. per acre.
Carting and stacking	7s. 6d. to 10s. ,,
Threshing	5½d. per bushel.
Bags and twine	2⅝d. ,,
Rent per annum	8s. 4d. per acre.

Paddock No. 1.

Fodder Crop.—Cape Barley and Rape. Area, 14·33 acres.

Dr. *Statement* 1. *Cr.*

	£	s.	d.		£	s.	d.
Ploughing, 4 inches deep, at 4s. 6d....	3	4	6	Agistment— 3·2 sheep per acre for 5 months at 1s. per month	11	9	3
Sowing, at 2s. 3d.	1	12	3				
Seed—							
6 bushels Cape Barley, at 5s.	1	10	0				
46 lb. Rape, at 4d.	0	15	4				
Superphosphate 7½ cwt., at 85s. per ton	1	11	10				
Rent (8 months), at 5s. 7d. per acre	4	0	0	Balance (loss)...	1	4	8
	£12	13	11		£12	13	11

Statement 2.—At the higher price of superphosphate the total cost would be £12 15s. 10d., and the account is balanced by the value of the agistment.

Paddock No. 1a.

Fodder Crop.—Algerian Oats. Area, 7·11 acres.

Dr. *Statement* 1. *Cr.*

	£	s.	d.		£	s.	d.
Ploughing, 4 inches, at 4s. 6d.	1	12	0	Agistment— 6·2 sheep per acre for 5 months, at 1s.	11	0	5
Sowing, at 2s. 3d.	0	16	0				
Seed, 9 bushels Algerian oats, at 3s. 6d.	1	11	6				
Superphosphate, 3½ cwt., at 85s. per ton	0	14	10				
Rent (8 months), at 5s. 7d. per acre	1	19	8				
Balance (profit)	4	6	5				
	£11	0	5		£11	0	5

Statement 2.—Total cost, £6 14s. 11d., which is balanced by the agistment.

Paddock No. 2.

Fodder Crop.—Algerian Oats and Rape. Area, 31·18 acres.

Dr. *Statement* 1. *Cr.*

	£	s.	d.		£	s.	d.
Ploughing, 4 inches, at 4s. 6d.	7	0	4	Agistment— 3·66 sheep per acre for 8 months, at 1s.	28	10	7
Sowing, at 2s. 3d.	3	10	2				
Seed—							
Algerian Oats, 18⅞ bushels at at 3s. 6d.	3	5	7				
Rape, 99 lb. at 4d.	1	13	0				
Superphosphate, 15 cwt., at 85s. per ton.	3	3	9				
Treating seed, at 2d. per acre	0	5	2				
Rent (8 months), at 5s. 7d. ...	8	14	1				
Balance (profit)	0	18	6				
	£28	10	7		£28	10	7

Statement 2.—Total cost, £27 15s. 10d., which is balanced by the agistment.

Paddock No. 2a.

Fodder Crop.—Algerian Oats and Rape. Area, 15·36 acres.

Statement 1.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
Ploughing, 4 inches, at 4s. 6d.	3	9	1	Agistment—			
Sowing, at 2s. 3d.	1	14	7	4 sheep per acre for 5 months, at 1s.	15	7	2
Seed—							
Algerian Oats, 9¼ bushels, at 3s. 6d.	1	13	3				
Rape, 50 lb. at 4d.	0	16	8				
Superphosphate, 8 cwt., at 85s. per ton	1	14	0				
Treating seed, at 2d. per acre	0	2	6				
Rent (8 months), at 5s. 7d. ..	4	5	9				
Balance (profit)	1	11	4				
	£15	7	2		£15	7	2

Statement 2.—Total cost, £13 17s. 10d., which is balanced by the agistment.

Paddock No. 5.

Algerian Oats for Hay. Area, 10·39 acres.

Statement 1.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
Ploughing-in fodder crop 4 in., at 4s 6d.	2	6	9	Agistment	4	16	3
Cutting wild melons	0	3	6	Oaten hay—28 tons 11 cwt. 62 lb., at 55s. per ton ...	78	11	10
Ploughing, 5 inches, at 8s. ..	4	3	1				
Sowing, at 2s. 3d.	1	3	5				
Seed — Algerian Oats, 10¾ bushels, at 3s. 6d.	1	17	8				
Treatment of seed, at 2d. per acre	0	1	9				
Superphosphate, 5½ cwt., at 85s. per ton..	1	3	4				
Cutting hay with binder, at 4s. per acre.	2	1	7				
Twine, at 1s. 6d. per acre ...	0	15	6				
Stooking, at 2s. 6d. per acre ...	1	6	0				
Carting and stacking, at 10s. per acre	5	3	11				
Thatching	1	10	0				
Rent (16 months) at 11s. 1d ...	5	15	2				
Balance (profit)	55	19	5				
	£83	11	1		£83	11	1

Statement 2.—The cost of the superphosphate is increased to £1 4s. 9d., reducing the profit to £55 18s. All other items are the same.

Paddock No. 6.

Cleveland Wheat for Grain. Area, 24·80 acres.

Statement 1.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
Ploughing-in fodder crop 4 inches, at 4s. 6d.	5	12	0	Agistment	5	3	5
Cutting wild melons	0	6	0	Wheaten hay—3 tons 10·4 cwt., at 70s. per ton ...	12	6	5
Ploughing, 5 inches, at 8s. ...	9	19	1	Wheat—			
Sowing, at 2s. 3d.	2	16	0	bus. lb. grade. s. d.			
Resowing headlands	0	2	2	476 0 1st at 6 0 ..	142	16	0
Seed—Cleveland Wheat, 14 bushels 9 lb., at 6s.	4	4	11	70 10 2nd „ 3 3 ..	11	8	0
Treating seed, at 2d. per acre	0	4	2	26 27 3rd „ 3 0 ..	3	19	4
Superphosphate, 6½ cwt., at 85s. per ton	1	7	7	3 42 4th „ 2 9 ..	0	10	2
Pulling strangers	1	7	6	11 4 5th „ 2 0...	1	2	1
Cutting with binder, at 4s. ...	4	19	6	Wheaten straw—32 tons 13 cwt. 101 lb., at 23s. 10d. per ton	38	19	4
Twine, at 1s. 6d.	1	17	4				
Stooking, at 2s....	2	9	9				
Carting and stacking, at 7s. 6d.	9	6	7				
Threshing, at 5½d. per bushel..	13	9	1				
Carting to barn, at ½d. per bushel...	1	4	5				
Grading, at 2d. per bushel ...	4	18	0				
Bags and twine, at 2¾d. per bushel	6	14	7				
Carting to rail, 1d. per bushel	2	8	11				
Covering straw stack	2	10	0				
Rent (16 months), at 11s. 1d...	13	16	0				
Balance (profit)...	126	11	2				
	£216	4	9		£216	4	9

Statement 2.—Superphosphate is increased by 1s. 8d. and pulling strangers £1 7s. 6d., carting to barn (£1 4s. 5d.) and grading (£4 18s.) omitted, reducing the total cost of the crop to £82 5s. 4d. The receipts include £97 17s. 11d., being the value of 587 bushels 23 lb. of milling wheat, at 3s. 4d. per bushel, instead of being sold at seed rates. Total profit, £72 1s. 9d.

Paddock No. 10.

Fodder Crop—Cape Barley and Rape. Area, 10·2 acres.

Dr. *Statement* 1. *Cr.*

Dr.	£	s.	d.	Cr.	£	s.	d.
Ploughing stubble, 4 inches, at 4s. 6d..	2	5	11	Agistment, 3·7 sheep per acre for 5 months, at 1s....	9	8	9
Sowing, at 2s. 3d.	1	3	0				
Seed—							
Cape Barley, 4 bushels 30 lb., at 5s.	1	3	0				
Rape, 28 lb., at 4d.	0	9	4				
Superphosphate, 5½ cwt., at 85s. per ton	1	3	5				
Rent (8 months), at 5s. 7d. ...	2	17	0				
Balance (profit)...	0	7	1				
	£9	8	9		£9	8	9

Statement 2.—Cost of superphosphate increased to £1 4s. 9d., making a total cost of £9 3s., which is balanced by the agistment.

Paddock No. 11.

Wheat for Grain. Area, 31·32 acres.

Dr. *Statement* 1. *Cr.*

Dr.	£	s.	d.	Cr.	£	s.	d.
Ploughing, 4 inches, at 4s. 6d. per acre	7	1	0	Agistment	11	8	10
Ploughing, 5 inches, at 8s. per acre	12	10	6	Wheaten hay—2 tons 11 cwt. at £3 19s. 9d. per ton ...	10	3	4
Sowing, at 2s. 3d. per acre ...	3	10	6	Wheat—			
Seed—16 bushels 38 lb. wheat, at 6s. (Federation, Bobs, Rymer, Yandilla King, Huguenot, Marshall's No 3, Steinwedel)	4	19	9	bus. lb. grade. s. d.			
Treating seed, at 2d. per acre..	0	5	2	328 22 1st at 6 0...	98	10	2
Superphosphate, 9½ cwt. at 85s. per ton	2	0	5	45 56 2nd ,, 3 3...	7	9	3
Pulling strangers	2	12	6	24 16 3rd ,, 3 0..	3	12	9
Cutting with binder, at 4s. ...	6	5	3	2 8 4th ,, 2 9...	0	5	10
Twine, at 1s. 6d. per acre ...	2	7	0	12 38 5th ,, 2 0..	1	5	3
Stooking, at 1s. 9d. per acre ..	2	14	10	Wheaten straw—17 tons 11½ cwt., at 23s. 10d. per ton	20	18	11
Carting and stacking, at 7s. 6d.	11	14	11				
Covering stack (2 hours) ...	0	2	0				
Threshing, at 5½d. per bushel..	9	9	5				
Carting to barn, ½d. per bushel	0	17	3				
Thatching straw stack... ...	1	5	0				
Grading, at 2d. per bushel ...	3	8	11				
Bags and twine, at 2¾d. per bushel...	4	14	9				
Carting to rail, 1d. per bushel..	1	14	6				
Rent (16 months), at 11s. 1d. per acre	17	7	1				
Balance (profit)...	58	13	7				
	£153	14	4		£153	14	4

Statement 2.—Superphosphate is increased by 2s. 4d. and pulling strangers £2 12s. 6d., carting to barn (17s. 3d.) and grading (£3 8s. 11d.) omitted, reducing the total cost to £88 4s. 5d. The returns from the sale of 415 bushels 20 lb. of milling wheat, at 3s. 4d. per bushel, would be £69 4s. 5d. Profit, £23 11s. 1d.

Paddock No. 12.

Algerian Oats for Grain. Area, 28·25 acres.

Dr. *Statement* 1. *Cr.*

	£	s.	d.		£	s.	d.
Ploughing, 4 inches, at 4s. 6d.	6	7	1	Agistment	10	9	9
,, 5 inches, at 8s. ...	11	6	0	Oaten hay, 2 tons 17 cwt. 98 lb., at 55s. per ton ...	7	19	4
Sowing, at 2s. 3d.	3	3	7	Oaten straw, 20 tons 6 cwt. 50 lb., at 23s. 10d. per ton	24	4	4
Seed—Algerian oats, 30 bushels, at 3s. 6d.	5	5	0	Oats, 1,039¾ bushels, at 4s.	207	19	0
Treating seed, at 2d. per acre	0	4	8	,, 150¼ ,, at 2s. 6d.	18	15	8
Superphosphate, 14½ cwt., at 85s. per ton	3	1	7				
Cutting with binder, at 4s. ...	5	13	0				
Twine, at 1s. 6d. per acre ...	2	2	4				
Stooking, at 1s. 9d. per acre ..	2	9	5				
Carting and stacking, at 7s. 6d.	10	11	10				
Threshing, at 4d. per bushel ..	19	16	8				
Thatching straw stack ..	1	13	4				
Carting to barn, ½d. per bushel	2	9	7				
Grading, at 1¾d. per bushel ...	8	13	6				
Bags and twine, at 2¾d. per bushel	13	12	8				
Carting to rail, ¾d. per bushel	3	14	4				
Rent (16 months), at 11s. 1d. per acre	15	13	1				
Balance (profit)... ...	153	10	5				
	£269	8	1		£269	8	1

Statement 2.—Superphosphate is increased by 3s. 8d., and carting to barn (£2 9s. 7d.) and grading (£8 13s. 6d.) omitted, reducing the total cost to £104 18s. 3d. The returns from 1,190 bushels of oats, at 2s. 6d. per bushel, would be £148 15s. Total profit, £86 10s. 2d.

Summary of the No. 1 Statements.

Based upon cost of operations and upon the actual receipts.

Paddock.	Profit.	Loss.
	£ s. d.	£ s. d.
No. 1	....	1 4 8
1A	4 6 5	....
2	0 18 6	....
2A	1 11 4	....
5	55 18 0	....
6	126 11 2	....
10	0 7 1	....
11	58 13 7	....
12	153 10 5	....
	£400 11 10	1 4 8
	1 4 8	
Total profit	£399 7 2	

Profit per acre = £2 4s. 4d.

Summary of the No. 2 Statements.

Based upon cost of operations and upon the prices a farmer would receive for his produce.

Paddock.	Profit.
	£ s. d.
No. 1 (Cost balanced by agistment) ...	....
1A " " "	....
2 " " "	....
2A " " "	....
5	55 18 0
6	72 1 9
10 (Cost balanced by agistment) ...	....
11	23 11 1
12	86 10 2
	£238 1 0
Profit per acre	£1 6 4

The Carriage of Small Parcels of Fruit by Rail.

Attention is directed to the existing charges for the carriage of small parcels of fruit by rail, as there is evidence that some orchardists are unacquainted with them.

Fruit and other perishable articles are charged at half the ordinary parcels rates when carried by Passenger train, and by Goods train the rates are still more reasonable.

The rates are as follow:--

Passenger Train.

Miles	Package not exceeding--					
	14 lb.	28 lb.	42 lb.	56 lb.	84 lb.	112 lb.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
25	0 3	0 3	0 5	0 6	0 8	0 9
50	0 3	0 5	0 7	0 9	1 0	1 3
100	0 5	0 8	0 11	1 2	1 8	2 0
200	0 9	1 2	1 7	2 0	2 9	3 6
300	1 0	1 8	2 2	2 8	3 8	4 8
400	1 2	1 11	2 8	3 2	4 2	5 2
500	1 3	2 2	3 0	3 8	4 8	5 8

Goods Train.

Miles.	Package not exceeding--			
	60 lb.	90 lb.	112 lb.	140 lb.
	s. d.	s. d.	s. d.	s. d.
50	1 0	1 0	1 0	1 0
100	1 0	1 0	1 3	1 6
200	1 3	1 9	2 3	2 6
300	1 6	2 3	2 9	3 3
400	1 9	2 6	3 3	3 9
500	2 0	2 9	3 6	4 3

Potato Scab.

G. P. DARNELL-SMITH, B.Sc., F.I.C., F.C.S., Biologist.

THE fungus *Oospora scabies* (Thaxt.) was at one time regarded as the universal cause of scab in potatoes, but this view is not held at present. Various fungi, besides other agencies, are now known to give rise to a roughening of the skin of potatoes.

Sometimes the trouble produced by one or other of these agencies has been designated as "true scab," sometimes as "scab," sometimes as "so-called scab," until, at the present time, when a man talks about scab in potatoes, there is no possible means of knowing to what he really refers, beyond the fact that the potatoes do not possess a normally developed skin.

The confusion in the use of the word "scab" is so great that it would be better to drop it altogether, but it is in such general use among growers that this is rendered impossible. The best thing, therefore, appears to be to accept the term "scab" as meaning a roughening or abnormal growth of the skin of the potato, with the proviso that the term conveys no suggestion as to how the abnormality is caused.

The Healthy Skin of the Potato.

Botanists recognise in plants a tissue known as "cork," which nearly always has a protective function, and which the plants usually have the power of producing or regenerating at a great rate.

The cells composing this tissue are easily recognised under the microscope by certain peculiar characteristics; they are flattened and arranged in rows, one above the other, tier upon tier. They are also recognised by certain chemical reactions.

Such cells reach their maximum development in the bark of the cork oak, from which the corks of commerce are made, but, as before remarked, cork tissue is widely distributed throughout the plant world. Often it is extremely thin, but wherever the plant requires protection this thin covering, capable of rapid reconstruction or thickening after injury, performs the function most admirably. The skin of the potato is really of the nature of cork; it is only a thin layer, but so long as it is intact it is highly protective.

At intervals in the skin are small slightly-raised openings—the lenticels—which serve for the ingress and egress of gases. The thickness of the skin varies with the variety of potato, and also with the nature and condition of the soil in which the potatoes are grown.

When the skin of a potato suffers an injury the plant seeks to repair it by producing an extra amount of corky cell substance around the seat of injury: thus a scab is produced. Hence, scabbing may be regarded as the manifestation of the efforts of the plant to repair injury and to protect itself from further attack.

Where the extra cork cells are produced—that is, where the scabs are formed—the skin is usually elevated, rough, and patchy.

Causes of Scab in Potatoes.

Injury may be caused to the skin of the potato by mechanical means, or by the attack of fungi, or the fungi may attack the potato because the skin is injured. In most cases the result is the same, viz., the potato attempts to repair the injury and to shut off its internal tissues from further damage by the production of an extra amount of cork—that is, by the formation of a scab. Any of the following therefore, may give rise to a crop of scabby potatoes:—

1. It is commonly held that planting potatoes in new ground, where there is plenty of wood ashes, or an abundance of lime, will cause scabbiness. This may be so, but the data to hand are not conclusive. It is quite conceivable that the tender skin of a young potato coming in contact with substances injurious to it would form a scab. Pressure of the tubers against unyielding soil will certainly cause scabbing.

2. Any abrasion of the skin produced by wire-worms, millepeds, cut-worms, or the grubs of the potato moth may result in scabbing.

3. Eel-worms.—The females of these minute worms penetrate the potato skin and there encyst. The embryo worms are set free by the rupturing of the body of the adult. The entrance of the eel-worm results in the production of a blister or gall on the potato. As the blisters may break and form rough patches, and as the eel-worms may attack the tuber at any stage of its growth, all sorts of scabs may be produced. The majority of scabby potatoes we have examined have been affected with eel-worms.

4. Any injury to the protective layer of cork, *i.e.*, to the potato skin, may result in the tuber being attacked by fungi. It is not always easy to determine whether the fungus can itself penetrate the thin corky layer, but fungus threads can certainly make their way through the lenticels. When attacked by fungi the potato tries to protect itself at the point of attack by producing an extra amount of corky tissue—it forms a scab.

The following fungi have been found associated with scab production on potatoes in Australia:—

(*a*) *Oospora scabies.*—The general appearance is that of mechanically produced scab, but there is, in addition, a whitish bloom on freshly-dug potatoes due to the fungus mycelium growing over the surface of the tuber. This mycelium is very transitory. On the surface of the potato reddish-brown spots are formed; these spread, and the skin of the potato becomes cracked and furrowed. Some of the fungus threads readily break up into a vast number of minute spores.

(*b*) *Rhizoctonia solani.*—This fungus passes through three different stages in its life, each of which is so unlike the others, that at first sight they appear to be quite distinct organisms.

1. On the surface of the potato black specks, which vary in size from $\frac{1}{32}$ to $\frac{1}{2}$ an inch, and which stand out clearly when wetted, are produced. This is the "Black Speck Scab." Each of these black patches is a sclerotium—a mass of fungus tissue that is resting, but which can, under suitable conditions, give rise to innumerable fungus threads.

2. These fungus threads may penetrate a tuber and set up a "rot," or they may spread over the surface, adhering to the skin and injuring it; the potato then scabs badly.

3. The fungus threads may come above ground as a white mould. Upon the ends of some of these clear ovoid cells are produced. Black speck scab is very common in Australia, but this form of the fungus is seldom seen.

(c) *Spondylocladium atrovirens.*—This fungus produces Potato Dry Scab, On the potato skin irregular white-spangled or pale violet blotches appear. richly sprinkled with small black spots. Under the microscope in a number of the external cells of the potato, a mass of fungal threads—a sclerotium—is to be found. From this sclerotium threads grow out into the air and these bear clusters of spores—conidia—one above the other. It is these spore-bearing threads which appear as black spots.

Corky or Powdery Scab is due to the fungus *Spongospora subterranea* (Wallr.), Johnson and Black Wart Disease is due to the fungus *Synchytrium endobioticum* (Percival).

So far as we are aware these fungi have not yet been introduced into Australia; there is, however, some danger of this being done, as the former has twice been detected in shipments of potatoes from Europe and Victoria.

Remedies.

It will be seen from the above that any treatment of seed potatoes which professes to prevent the spread of scab, must be accompanied by a very carefully-prepared check. The seed to be subjected to treatment must be first most carefully examined to determine to what the scabbiness is due, for, as already stated, scab is simply an indication of a pathological condition made known by the formation of cork in undue quantity around the seat of injury.

When a potato is planted the tubers produced from it are frequently a considerable distance away, and fungus disease on the seed may or may not reach these. If the scabbing of the seed is due to mechanical injury or to eel-worms no dipping will have a beneficial effect, for mechanical injury is not transmissible, and with the eel-worms, as the infected seed-potato is used up and partially rots, the young eel-worms escape into the soil only to infect the fresh crop.

Where the potato scab is due to fungus, dipping may have a most beneficial effect by killing the spores and preventing the spread of disease.

Experiments have been carried out by the Department during the last few years upon the effect of treating seed potatoes with formalin in order to prevent scab. The results have been somewhat indefinite and inconclusive, because, as pointed out previously, scab may be due to a variety of causes. It is not proposed at the present time to continue these experiments.

There is no doubt that when formalin is used to treat seed potatoes affected with scab that is due to fungus disease, the treatment with formalin is decidedly beneficial; but where the scab has been produced by mechanical causes, or by eel-worms, the formalin treatment has little or no effect. The eel-worms are embedded in the tissue of the potato, and many of them are not killed by dipping the potato in formalin.

As a seed potato affected with eel-worms germinates in the ground, its tissues become softer, and sometimes rot to a certain extent. In any case the eel-worms can escape, and make their way to the young potatoes of the new crop. Further, it is possible to find that seed potatoes which look quite healthy, or that have been dipped in formalin before planting, because of slight blemishes, give, nevertheless, a crop that is scabby. For the ground in which they are planted may contain fungi capable of producing scab, or it may contain eel-worms.

It was formerly recommended that seed potatoes should be dipped for two hours in a solution of 1 part of commercial formalin diluted with 300 parts of water.

There was some reason to think that this solution was too strong, and that while it might not be injurious to potatoes that had formed no young shoots at the eyes, it might act injuriously when such very young shoots were present.

This matter has been tested, and the conclusion arrived at is that for some potatoes 1 part of commercial formalin to 300 parts of water, or even 400 parts of water, is too strong.

However, dipping potatoes in a solution of 1 part of commercial formalin to 500 parts of water does not appear to have any injurious effect upon germination, and, so far as laboratory tests go, it appears to act as an efficient fungicide, so that in all cases where fungus disease is suspected, the practice of dipping potatoes in this solution is to be recommended.

Whenever possible perfectly clean seed should be used. If, however, this is not obtainable, then dipping should be used as a safeguard, for the unpractised observer is not likely to be able to tell by mere inspection to what an appearance of scab on potatoes is due. If a sample of the suspected potatoes is submitted to the Department, the cause of the scabbiness can be determined.

It is the usual experience of growers that in a good season with an adequate rainfall, very little scab is produced, but that in a bad season, with a limited rainfall, scab may be very prevalent. We have some reason to believe that eel-worms, which attack a variety of plants, do more damage in dry seasons than in wet ones. Be this as it may, the potato shows itself to be no exception to the general rule that a plant is best able to resist disease when its manurial and physiological requirements have been satisfied.

It has been suggested that dipping in formalin solution may in some way "preserve" the seed potato and prevent its normal germination. In our experiments the 1 in 300 and 1 in 400 formalin, while it did, to a certain extent, interfere with germination, in no way acted as a preservative—that is to say, all that remained of the original seed potato on digging up the plant was a thin shell, in no way differing from that of an untreated seed potato.

Whole seed potatoes after treatment germinated slightly better than cut seed after treatment, although the potatoes were dipped first and cut afterwards. The experiment was tried of dipping potatoes in formalin solution for two hours and then planting them at once, and dipping them in formalin solution for two hours, and then keeping them a week before planting. No difference in the germination of the two lots of potatoes was observed.

Insectivorous Birds of New South Wales.

[Continued from page 792.]

WALTER W. FROGGATT, F.L.S., Entomologist.

43. The Black Cockatoo (*Calyptorhynchus funereus*).

THOUGH there are only five species of Black Cockatoos found in the whole of Australia, three of them are common in this State. The above species (*C. funereus*) often known as the Yellow-eared Cockatoo, is the most common and has the widest range, being found in Tasmania, the islands in Bass' Straits, through the coastal ranges of Eastern and South Australia, and sometimes even finding its way in search of honey blossoms and insects into the more inland forests and mallee scrubs.

Like all the members of the Cockatoo tribe they nest in the holes or rotten branches of tall dead gum trees, in which the female lays two white eggs. Under ordinary conditions they are true forest haunting birds.

Though their chief food supplies are the seeds and honey blossoms of our larger forest trees, these birds play an important part in the economy of nature and the life of our forest trees.

In Europe and America a large family of forest birds, popularly known as Woodpeckers, police the forests, and with their sharp-pointed beaks drill out and destroy the thousands of wood-boring insects and their larvæ that would otherwise kill the trees. In Australia we have no representative of the Woodpecker, but the Black Cockatoo with its powerful gnawing bill hunts over the trunk and branches of infested trees and tears out great strips of bark and wood beneath which the wood-moth and beetle larvæ are burrowing and feeding. Mr. E. Palmer, of Lawson, once showed the writer the stem of a gum-tree about 6 inches in diameter that had been cut right through by a Black Cockatoo hunting out a wood-grub, and it is not an uncommon thing to come across branches of wattles and gum-trees in the valleys of the Blue Mountains torn and splintered in this manner where these Cockatoos have been at work.

Our black and silver wattles along our coastal country are very much subject to the attacks of large white grubs, the larvæ of the goat-moths (*Eudoxyla eucalypti*). The branches and trunks of these scrub trees as they mature are often full of these wood-borers, which used to be sought after by our blackfellows in the old days. It is recorded that the Black Cockatoos used to visit this country every season, and between the two the wattles were more or less cleared of wood-borers before the advent of the white man.

With increasing settlement these shy birds have been shot, or driven out of their old haunts, and this is probably why many of our wattles are now such short-lived trees. As one of our few forest rangers, the Black Cockatoo should be most carefully protected.

44. Black-breasted Plover (*Zonifer tricolor*).

This handsome ground bird has a very wide range over Australia, and is common on the open grassed plains, about the edges of swamps or river flats. They are usually found in small parties of four or five, tripping over the ground hunting for the insects and small crustaceans found in such localities, rising with a sharp cry when startled, but seldom flying very far before again alighting. In the nesting season they are very wary, and if sitting on the four dark brown, blotched, top-shaped eggs, simply deposited in a depression among the grass, the female will creep away at the first alarm, and flying in front of the intruder, flutter over the grass pretending to have a broken wing, or some more serious malady, chattering all the time as she edges the unwelcome stranger away from her precious eggs.

The colouration of these eggs so closely resembles the surrounding soil that they are very hard to detect unless the bird is disturbed whilst sitting upon them. The nestlings can run as soon as they emerge from the shell, and their brown and drab suits of down are even more adaptive to their surroundings than the colouration of the eggs. At the first warning cry of the mother the baby Plovers at once scatter among the surrounding grass and instinctively squat flat down, hardly moving an eyelid, and even on a bare plain will often successfully fool the inquisitive hunter.

After the nesting season the family parties gather together in small flocks of a dozen or more, and hunt over the open plains, their rich black, white, and reddish-brown plumage giving them a very attractive appearance.

Looked upon as game birds by the sportsman out to kill, they used to be often shot and added to his bag, but the country resident, however keen a sportsman among wild duck and larger game, is seldom guilty of shooting at our useful Black-breasted Plover.

The Use of Scions with One or Two Eyes in Grafting Vines.

A correspondent recently asked the Department whether the scions used in grafting should have one or two "eyes," and also whether raffia was preferred to calico for tying the grafts.

In reply, the Superintendent of the Narara Viticultural Station stated:—

In field-grafting, scions with one or two eyes may be used.

Personally, I prefer one good plump eye taken from a well-ripened and fruitful cane with an inch of wood left above, in order to provide the bud with sufficient moisture until the formation of the knitting tissue. The height of the mound which covers the graft is thus considerably reduced, and therefore is less affected by the strong dry westerly winds. Too rapid evaporation is also avoided.

In my opinion the union of the graft is much stronger from one than two eyes, both in the field and bench grafting, owing to the fact that growth commences so close to the union, and consequently is less affected by strong winds than would otherwise happen if two eyes were used. The objection to a scion with two eyes is that the terminal bud develops and there is the danger of having a lanky scion which would become top-heavy, and might be snapped off by the first strong wind.

With regard to the use of raffia, in my opinion it is superior to calico. Experience has shown a higher percentage of good grafts where calico has not been used, probably because the flowing sap escapes more readily.

Approximately one-quarter natural size.

INSECTIVOROUS BIRDS OF NEW SOUTH WALES.

"THE BLACK COCKATOO."

INSECTIVOROUS BIRDS OF NEW SOUTH WALES.

"THE BLACK-BREASTED PLOVER."

Zonifer tricolor.

Approximately one third natural size.

A Descriptive Catalogue of the Scale Insects ("Coccidae") of Australia.

[Continued from page 684.]

WALTER W. FROGGATT, F.L.S., Entomologist.

Mytilaspis subspiculifera, n.sp. (Pl. VI, fig. 1.)

This scale was found upon the bark of the branches of the Yarran (*Exocarpus aphylla*) at Whitton, New South Wales.

Female puparium dull white, variable in form, short and broad in proportion, broadest and rounded behind convex, pellicles dull yellowish brown, first small, second large, shining, $\frac{1}{30}$ inch length. Male puparium similar colour, smaller and shorter.

Adult female yellow, elongate, rounded at apex. Pygidium darker, with the outer margin serrate and fringed with distinct scattered bristles, the terminal lobes large, broad, projecting, separated from base with an angular lobe on the outer side; circumgenital glands scattered over the surface, not in a group; orifice large rounded.

Mytilaspis spinosa, Fuller.

Trans. Ent. So., London, p. 469, pl. xv, fig. 4-5. 1899.

Specimens obtained on foliage of Ti-tree (*Melaleuca sp.*) in the vicinity of Perth, West Australia.

Female puparium of a woolly texture, white, pyriform, usually curved, pellicles yellow, length 0·075, width 0·03 inch.

Adult female brown, sub-elliptical termination of abdomen, with a median depression, with small lobes on either side between which are a pair of small spines. Five groups of circumgenital glands with spines on the sides of segments. Antennæ by horny processes.

1128. *Lepidosaphes spinosa*. Cat. Coccidæ, p. 314.

Mytilaspis wilga, Leonardi.

Annali di Agricoltura, vol. v, p. 43. 1903.

This species has been described by Leonardi as having been found in New South Wales. I have been unable to obtain the paper containing the description. From its name it would appear that it has been found infesting one of our native shrubs, the Wilga.

Genus VI. *Ischnaspis*, Douglas.

Entomologist's Monthly Magazine, vol. xxiv, p. 21. 1887.

Douglas defines the genus as follows. "Female scale very long and narrow, sides parallel, larval exuviæ with a fringed margin followed by two

moults, of which the latter is very long; pygidium without spinnerets in groups, but having a design of irregular lattice-work, composed apparently of thickening of, or under, the integument in that pattern.

"Male scale not half the length of the female, of like form, but only one moult beyond the larval exuviæ: Imago not known." Only the typical species is known and constitutes the genus.

Ischnaspis longirostris, Signoret.

(*Mytilaspis*) *Bull. Soc. Ent.*, France (6), vol. ii, p. xxxv. 1882.
filiformis, Douglas, *Ent. Monthly Magazine*, vol. xxiv., p. 21. 1887.
,, Maskell. *Trans. New Zealand Inst.*, xxvii, p. 52. 1894.
,, Newstead, *Ent. Monthly Magazine*, xxxiv, p. 94, 1898, and British Coccidæ, 1901.

There is some question about the proper determination of this species. Newstead places it under the name given to it by Douglas, though Signoret's name, if correctly determined by subsequent writers, was given five years previously. It was probably originally a native of Demerara or the West Indies upon palms, from which it has spread on to the Magnolia, Coffee, Monstera and many other plants, and has been introduced into many countries (England, United States, New Zealand, Australia, and Japan) where it is found in hothouses. Douglas records it as very common in the conservatories in the Royal Botanic Gardens at Kew. He describes the female puparia, as looking like little bits of black silk thread attached to the leaves. These puparia are shining black with greyish margins, long and narrow, eight times longer than broad. They enclose a very slender bright yellow female, which however only occupies a part of the puparia.

The specimens recorded by Maskell from Australia were obtained by Mr. Quinn upon palms in a hothouse in South Australia.

1432. *Ischnaspis longirostris.* Cat. Coccidae, p. 318.

Genus VII. *Poliaspis*, Maskell.

Trans. New Zealand Institute, vol. xii, p. 293. 1879.
Maskell, *Coccidæ of New Zealand*, 1887, p. 56.
Comstock, *Report U.S. Dep. Agriculture*, 1880, p 313.
Newstead, *Monograph on British Coccidæ*, vol. i, p. 176. 1901.

The female scale is rather elongate, more or less pyriform, as in *Chionaspis*, dilated behind.

The male scale smaller, with parallel sides.

Newstead says: "The distinctive characters are the non carinated puparia (scale) of the male and the pygidium of the female, possessing more than five groups of circumgenital glands, with the dorsal tubular spinnerets arranged in distinct serial bands as in *Aulacaspis*."

The genus is a comparatively small one, containing only eight species, four of which are peculiar to Australia, one from Natal, another from the United States and Britain, a third from Japan, and the fourth from New Zealand.

Fig. 1.—*Mytilaspis subspeculifera*

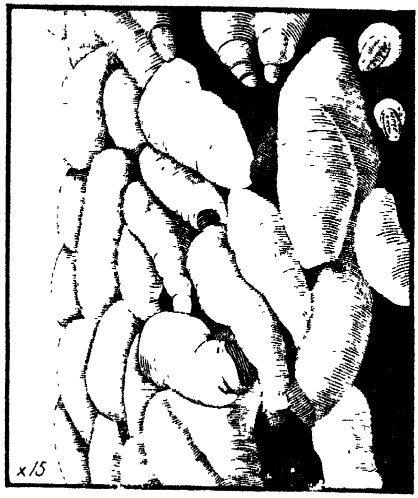


Fig. 2.—*Poliaspis exocarpi*

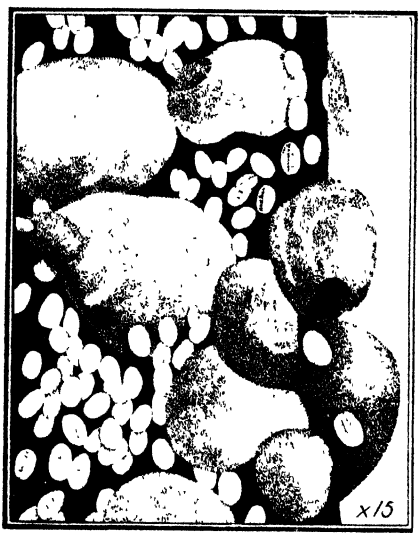


Fig. 3.—*Diaspis pentagona*

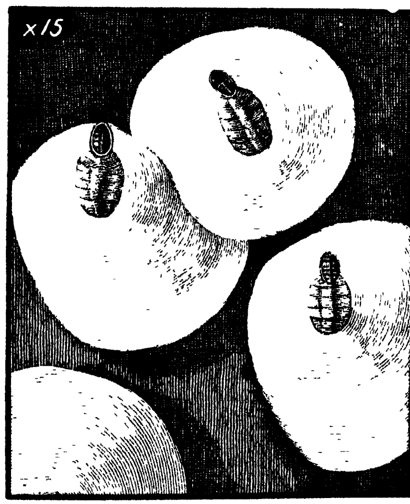


Fig. 4. *Diaspis rosæ*

Fig. 5.—*Fiorinia acaciæ*.

Poliaspis casuarinæ, Lidgett.

The Wombat, vol. iv, p. 14. 1898.

Described on *Casuarina suberosa* at Myrniong, Victoria.

As this publication (*The Wombat*) is not a well-known journal outside Victoria, the writer gives the author's description *verbatim*.

"Female puparium snowy white, tapering at one end; pellicles terminal, brown in colour. Usually placed longitudinally along the branches. Length, $\frac{1}{16}$ inch. Male puparium, dull white, in shape similar to female; very slightly (if at all) carinated; pellicles terminal, yellow. Length, about $\frac{1}{20}$ inch.

"Adult female deeply segmented; elongated, abdomen ending in two lobes. Many single spinnerets and several 'groups.' No sign of any abdominal fringe. Ground colour yellowish-brown. Average length before gestation, $\frac{1}{26}$ inch. Type in Gordon Technical College Museum."

1156. *Poliaspis casuarinæ*. Cat. Coccidæ, p. 243.

Poliaspis exocarpi, Maskell. (Pl. VI, fig. 2.)

Trans. New Zealand Institute, vol. xxiv, p. 17. 1891.

This handsome coccid was originally described from specimens obtained near Mordialloc, Victoria, upon the "Native Cherry" (*Exocarpus cupressiformis*). It has, however, a wide range over Australia, and Maskell afterwards recorded it from a number of different plants and localities, as follows:—Port Darwin, Northern Territory, on *Santalum sp.*; Bankstown, New South Wales, on *Oxylobium trilobatum*: Botany, New South Wales, upon *Dillwynia ericifolia*: Albany, West Australia, on *Leptospermum sp.* Female and male puparia, massing together over the stems and twigs, snow white, the males usually very abundant. The female scales about $\frac{1}{25}$ inch in length, rather straight on sides, swollen out behind; pellicles light yellow. Male puparium small, slender, rounded to the tips, and attached to the twigs by the base, so that they hang down.

The adult female is brown, elongated, with the tip of the abdomen terminating in two very minute lobes.

1158. *Poliaspis exocarpi*. Cat. Coccidæ, p. 243.

Poliaspis intermedia, Fuller.

Journal West Australia Dep. Agriculture, vol. iv, 1897, p 1345.
Trans. Entom. Society, London, p. 470, pl. xv, f. 46. 1899.

This species was very briefly described in the *Journal* and enlarged upon in the Transactions. The specimens were found upon a "leguminous plant" growing near Perth, West Australia. "Female scale pyriform, generally curved, very convex, white, pellicles light yellow. Length 0·06, width 0·03 inch." The scales are much lighter than *Poliaspis nitens*, and the insects cluster together in colonies, containing great numbers of female scales.

1159. *Poliaspis intermedia*. Cat. Coccidæ, p. 243.

D

Poliaspis nitens, Fuller.

Journal West Australia Dep. Agriculture, vol. iv, 1897, p. 1345.
Trans. Entom. Society, London, p. 470, pl. xv, p. 471. 1899.

This species was described from scales infesting an undetermined species of *Davisia* growing about the Swan River, near Perth, West Australia.

"Scale of female pyriform, broad, convex, generally straight, exuviæ reddish yellow, the second being lighter than the first. Remainder of scale pure silvery white. Length 0·09 inch, width 0·035 inch.

"Male scale white, with a faint median carina."

This species differs from *Poliaspis exocarpi* in the number and arrangement of the groups of spinnerets and the number of pores in each.

1161. *Poliaspis nitens*. Cat. Coccidæ, p. 244.

Genus VIII. *Leucaspis*, Targioni-Tozzetti.

Catalogue, p. 41. 1869.
Signoret, *Ann. Soc. Ent. France* (4), vol. x, p. 100. 1870.
Comstock, *2nd Report Entom. Cornell University*, p. 120. 1883.
Maskell, *Trans. New Zealand Institute*, vol. xxv, p. 209. 1892.
Green, *Coccidæ of Ceylon*, p. 38.

This is a small group, of which eight species have been described. Four of these are found upon pine trees in Europe, a fifth from Greece on the olive. Two others come from Japan; the first upon the bamboo, and the second, *L. japonica*, upon apple, broom, maple, &c. The eighth is peculiar to Australia, on a native plant belonging to the Family *Liliaceæ*.

Green defines the genus, "Female puparium elongate; occupied almost entirely by the large second pellicle, which encloses the adult female, and is itself usually concealed by a covering of opaque white secretion. Male puparium similar in form, but smaller. Circumgenital glands confluent, forming an irregular arch. Margin of pygidium with a continuous fringe of spine-like squames."

Leucaspis cordylinidis, Maskell.

Trans. New Zealand Institute, vol. xxv, p. 209. 1892.

This species was found upon an undetermined species of Cordyline growing near Sydney, New South Wales.

Maskell says: "Female puparium rather convex, narrow, elongated, and straight; colour white; pellicles terminal, small greenish brown. Length of puparium, about $\frac{1}{15}$ inch. Frequently covering the leaves of the plants in immense numbers. The male puparium similar in form, but smaller."

The female measures $\frac{1}{26}$ of an inch in length, is brown in colour, elongated, with the abdomen terminating in a single lobe, broader than long, and finely crenulated on the posterior edge. The margins of the abdomen are fringed with fine teeth and short hairs forming a fringe. This broad median terminal lobe and the greenish brown pellicles distinguish it from allied forms.

1164. *Leucaspis cordylinidis*. Cat. Coccidæ, p. 244.

Genus IX. *Diaspis*, Costa.

Prospetto neuova, Div. Met. Coccus, p. 7. 1828.
Green, *Coccidæ of Ceylon*, pt. i, p. 86. 1896.
Newstead, *Monograph British Coccidæ*, vol. i, p. 151. 1901.

The members of this genus are defined by the more or less circular form of the adult female puparium; they may be flat or convex, but the pellicles are always situated well within the margin.

The male puparium elongated, with well-defined pellicle and a longitudinal carina in the middle. Newstead says: "That while in some species the male scales are strongly tricarinate, in others the carinæ are either absent or faintly indicated."

Comstock says that the members of the genus closely resemble those of the genus *Aspidiotus* in the form of the female scale, but are easily distinguished by the form of the male scale.

According to Cockerell, this genus is not represented in Australia, as he created a new genus *Aulacaspis*, in which he places all our species.

Including all species in which the male scale is strongly tricarinate, I follow Newstead, who says: "The non-carinated forms I consider imperfect, and I do not see (as long as the puparia are tricarinate) that it matters whether they are faintly or strongly pronounced."

It is a cosmopolitan genus found upon all kinds of different trees and plants. About thirty species have been described, of which four, all introduced, are recorded from Australia.

Diaspis boisduvalii, Signoret.

Ann. Soc. Ent. France (4), vol. ix, p. 432. 1869.
Maskell, *Trans. New Zealand Institute*, vol. xi, p. 200, 1878; p. 23, 1884; Scale Insects, New Zealand, p. 46, pl. iv, f. 5, 1887.
Newstead, *Mon. British Coccidæ*, vol. 1, p. 152. 1901.

Probably a native of Europe, this is now a cosmopolitan species common in hothouses, though not recorded from Africa or the East. It has been found on acacias and palms in New Zealand, and upon orchids from South Australia.

The female puparium circular or ovate, somewhat flattened, semi-transparent, but the enclosed female and eggs beneath give it a greyish-yellow tint; the pale yellow pellicles situated towards the centre. Length, $\frac{1}{12}$ inch. Male puparium elongate, strongly tricarinate. Maskell says: "A strong median keel, with edges raised so as to appear like two other keels." Clothed with curled woolly filaments and fluff, when massed together it is difficult to distinguish the shape of the scale.

Adult female widely ovate, narrow posteriorly, thoracic spine on either side near the head, rudimentary antennæ and single curved spine pygidium, with five groups of circumgenital glands, with three pairs of lobes on either side.

1096. *Diaspis boisduvalii.* Cat. Coccidæ, p. 228.

Diaspis bromeliæ, Kerner.

Naturgeschichte des Coccus bromeliæ, Stuttgart, 1788.
Signoret, *Ann. Soc. Ent. France* (4), vol. ix, p. 434. 1869.
Newstead, *Mon. British Coccidæ*, vol. 1, p. 156. 1900.

This is the common white scale of the pineapple, but it has often been recorded, chiefly upon hothouse plants in Europe and the United States, and has probably been introduced upon some species of Bromelia, if not with the cultivated pineapple. It is found in North America, Mexico, and the Hawaiian Islands, and is said to be doubtfully identified from Queensland.

The writer saw a great deal of it on the base of the leaves in the plantations at Honolulu, and Van Dine says it is found in South Africa.

Female puparium almost circular, very thin, almost transparent, with a snow-white tint; the pellicles near the margins vary in colour from dark yellow to light brown. Diameter, $\frac{1}{12}$ inch.

Adult female yellow, pyriform, margin of pygidium with three pairs of lobes, with five groups of circumgenital glands. Thoracic spine or tubercle, so distinct in last species, wanting in this.

The male puparium resembles that of the last species in being covered with woolly filaments, but they are not so numerous, and the pellicles are darker.

1097. *Diaspis bromeliæ.* Cat. Coccidæ, p. 228.

Diaspis pentagona, Targioni. (Pl. VI, fig. 3.)

Revista di Bacricolture, p. 11. 1885.
Diaspis amygdali, Tryon, *Report Ins. and Fungus Pests, Queensland Dep. Agr.*, p. 89, 1889; Maskell, 1894; Green, 1896.
Diaspis lanatus, Cockerell and Morgan, *Jour. Institute. Jamaica*. p. 137. 1892.
,, *patelliformis*, Sasaki, *Bull. University Tokyo*, vol. ii, p. 107. 1894.

This has been popularly known as the "West Indian Peach Scale" and the "White Chaff Scale" in Queensland. It has been found upon cherry, plum, apricot, peach, grapes, and other deciduous trees, and upon several garden shrubs like hibiscus and geranium. It is world wide in its range, and though first described from Italy, its native home is doubtful. In Australia it is more common in Queensland than in the southern States.

Female puparium snowy white, exuviæ brownish yellow, general form broadly ovate, sides somewhat compressed, convex; no central keel. Length, $\frac{1}{12}$ inch. The scales, however, are often dirty grey to light brown, from the dirt and particles of the bark of the host plants, and are sometimes not very noticeable.

Adult female white to pinkish-yellow, with the tip of abdomen reddish-brown; general form broadly oval; on the dorsal surface of each segment two large depressed spots, pygidium terminating in a pair of large pointed lobes; five groups of circumgenital glands.

Male puparium white, pellicle pale yellow, not carinated, usually clustered together in a mass on food plant. Very narrow, nearly three times as long as its breadth. Both male and female scales often encrust the branchlets

and twigs, the males massed together, attached by the anterior extremity, hanging loosely, from which they take the name of "chaff scale."

When numerous and untreated this scale will kill its host. In Japan and Italy it is a pest to the mulberry. Green says: "It kills garden plants in Ceylon, and is a serious pest to geraniums growing in sheltered corners; in Trinidad it infests the pawpaw tree."

Three varieties have been described: *D. aurantícola* by Cockerell on *Osmanthus ilicifolia*, *D. rubra* by Maskell on *Orixa japonica* from Japan and Ceylon, and *D. theæ* as a tea pest in Northern China.

1125. *Aulacaspis pentagona.* Cat. Coccidæ, p. 234.

Diaspis (*Aulacaspis*) *rosæ*, Bouché. (Plate VI, fig. 4.)

Aspidiotus rosæ, *Naturgesch. d. schadl. und nutzl., Mit der Insecten*, p. 14, 2, pl. 1, fig. 6. 1834.

Diaspis rosæ, Sign. *Ann. Soc. Ent. France*, p. 441. 1869.

,, ,, Maskell, *Scale Insects, New Zealand*, p. 4. 1887.

Aulacaspis rosæ, Newstead, *Mon. British Coccidæ*, vol. i, p. 168. 1900.

This is the common white scale of the cultivated rose, but it is also found upon myrtle, pear, mango, ailanthus and cycus. It sometimes infests blackberries (in New Zealand) so thickly that they die back, and it was once suggested (under the impression that it was a new scale) that it should be introduced among the blackberry thickets on our Northern Rivers to kill out the blackberry bushes. It is almost cosmopolitan in its range, but is not recorded from Africa.

Female puparium pure white, opaque, nearly circular or broadly pyriform, convex; pellicles dull yellow on the margin or projecting just beyond the edge. Loosely attached to the bark. Length, $\frac{1}{12}$ inch.

Adult female dull crimson to bright orange; elongate, widest in front and broadly rounded, with marginal depressions; pygidium very large, with five groups of circumgenital glands, with terminal lobes and stout spines between.

Male puparium white, slender, strongly carinated, central one best defined; pellicles varying from yellow to brown. Length, $\frac{1}{25}$ inch.

On account of its soft texture this scale has many enemies, but where plentiful it spoils the rose bushes, causing the twigs to die back.

1127. *Aulacaspis rosæ.* Cat. Coccidæ, p. 236.

Genus X. *Fiorinia*, Targioni-Tozzetti.

Catalogue, p. 42. 1869.

Signoret, *Ann. Soc. Ent. France* (4), vol. ix, p. 449. 1869.

Maskell, *Scale Insects, New Zealand*, Dep. Agri., p. 57. 1887.

Green, *Coccidæ of Ceylon*, pt. 1, p. 93. 1896.

Out of the twenty-seven species of this genus described, chiefly from the East, nine species found upon native trees and shrubs are peculiar to Australia.

The adult female is smaller than the second pellicle, in which she is enclosed. Green says: "The female at the second moult shrinks in size, and thus becomes detached from the skin of the previous stage. The eggs or young larvæ are deposited within the receptacle. The female puparium, consisting principally

of this enlarged second pellicle, with sometimes a slight secretional margin, is elongate, with the first pellicle projecting beyond the anterior margin."

The male puparium is elongate, small and narrow compared to the female; white, with or without carinæ, and the pellicle at the anterior extremity. The males are in general appearance like that of Chionaspis.

Morgan (*Entomologist's Monthly Magazine*, vol. xxviii, 1892), in a paper entitled "Observations on Coccidæ," proposes to substitute Comstock's generic name *Uhleria* for *Fiorinia*; but his example has not been followed by any subsequent writers.

Fiorinia acaciæ, Maskell. (Pl. VI, fig. 5.)

Trans. New Zealand Institute, vol. xxiv. p. 16, 1891, pl. 1, figs. 15-17.
Froggatt, *Agricultural Gazette N. S. Wales*, p. 719. 1902.

This coccid was described from South Australia infesting the foliage of the Golden Wattle (*Acacia pycnantha*). It has a wide range over Australia, being found upon the trunk, branches, and foliage of half a dozen different kinds of wattles (*Acacias*).

Female puparium dark brown to almost black. Maskell says that it is really yellowish, but appears black on account of the coloration of the second pellicle which forms the greater part of the puparium. Elongate, convex, first pellicle yellowish brown. Length, $\frac{1}{16}$ inch.

Adult female dark brown, elongate, abdominal extremity truncate with a single median lobe with two deep incisions, four to five spiny hairs; five groups of spinnerets.

Male puparium snow white, deeply ribbed down the centre, narrow with parallel sides, and the apex almost truncate; pellicle dark reddish-brown. The male scales are very conspicuous upon the bark, and have a superficial likeness to those of *Chionaspis citri* or "white louse" of the citrus trees. As it often covers wattles growing in the vicinity of orchards, it is often confused by orchardists with that species.

Fuller has described a variety, which he calls *bilobis*, from West Australia on *Acacia pulchella*. This differs from the typical form in having the median lobe divided so that there are two lobes closely adjacent, though at first sight it appears as one semicircular lobe.

1172. *Fiorinia acaciæ*. Cat. Coccidæ, p. 246.

Fiorinia casuarinæ, Maskell.

Trans. New Zealand Institute, vol. xxix, p. 327, pl. xix, figs. 7-9. 1897.

Found on the under surface of the foliage of a "Sheoak" (*Casuarina sp.*), near Perth, West Australia.

Female puparium snowy white, but clouded by the second pellicle beneath the secretion giving it a dark brown tint, elongate, narrow. Length $\frac{1}{12}$ inch.

Adult female brown, without any lobes, but the pygidium finely serrate on margins, and two fine hairs at apex; no spinnerets but small circular openings within the margin. Length, $\frac{1}{40}$ inch.

Male puparium similar to that of female, but with only one pellicle.

(To be continued.)

The Prickly Pears of Interest to Australians.

J. H. MAIDEN,
Government Botanist of New South Wales, and Director, Botanic Gardens, Sydney.

No. 12.—The Cochineal Cactus.

(*Opuntia cochinillifera*, Mill., or *Nopalea cochinillifera*, Salm.-Dyck.)

COMPARISON with No. 8 of this series, *Opuntia* (*Nopalea*) *dejecta*, Salm.-Dyck, this *Gazette* for November, 1913, p. 973, will at once show the strong affinity between them.

Botanical Description.—*O. cochinellifera* (Cochineal) articulis ovato-oblongis subinermibus, Miller's Dictionary, 8th Edition, No. 6. *Cactus cochinellifer* Linn. *Species Plantarum*, p. 670, Willdenow's *Species Plantarum* 2, p. 944, Hort. Kew. Edition 2, v. 3, p. 179. *Tuna* mitior flore sanguineo cochinellifera. Dillenius Elthamensis, 399, t. 297, f. 383.

Habitat in America merid. Floret July-September. Cult. ante 1688.

Obs.—This species has the smallest flowers of any in the genus known to me. It is the most proper to cultivate the Coccus Cacti, or Cochineal Insect, upon, because its spines are far smaller than in any other species, and consequently less annoy the hands employed to collect the Cochineal from it. But the last species (*O. Ficus-Indica*), although more spiny, is often grown for the Cochineal, and in all probability the insect would thrive very well upon any of the species, yet perhaps best upon the least spiny. (*Succulent Plants*, A. H. Haworth, p. 192.)

O. cochinillifera (Miller's *Dictionary*, Edition 8, No. 6, Haw. *Syn.*. 192) Plant erect; joints obovate, nearly unarmed; petals connivent; stamens and style exserted. Native of South America. *Cactus cochinillifera*, Linn. *Species Plantarum*, p. 670, Hooker in *Botanical Magazine*, 2741 and 2742. Dillenius *Elthamensis*, t. 297, f. 383. Joints while young oblong, areolate, at length obovate-oblong. Flowers blood-coloured ex Dillenius *Elthamensis*, small spreading a little. Spines slender, blackish. The ripe fruit is said to check fluxes by its mild restringency. Flowers red. Perhaps *Nopal de Castille*. Thierr-Menonville, voy. Guax. 2, p. 278, is the same as this plant.

Cochineal-bearing Indian Fig. Fl. July, Sept. Cult. 1688. Shrub 3 to 5 feet. (*History of Gardening and Botany*, Don. Vol. 3, p. 173.)

Economic Value.—We have got into the way of almost exclusively applying the term "Spineless Cactus" to the so-called "Indian Fig" or "Barbary Fig," *Opuntia Ficus-indica.* (See this *Gazette* for January, 1913, p. 49.) But the present form is even less spiny.

For centuries it was the principal plant on which the Cochineal insect was grown, but the value of this product has enormously diminished since the introduction of aniline dyes. As the insects had to be handled a good deal, it is obvious that freedom from spines on the food-plant was a great desideratum, and hence this was the plant chiefly cultivated by those engaged in the Cochineal industry. As this is now dying out, it can have no very great interest for us, but a full account of the Cochineal insect industry and the *Opuntias* formerly used to feed them can be seen in G. Don's "History of the Dichlamydeous Plants," iii, 173.

Figures and some account of the plant will be found in the *Botanical Magazine*, tt. 2741 and 2742. See also a black and white figure in Martius' *Flora Brasiliensis* iv, part 2, plate 60, by Schumann. Sargent's *Silva of North America*, xiv, 11, may also be referred to.

Leaving out the preparation of cochineal as negligible for our requirements, I believe this plant will have some future before it in coastal New South Wales as pig-feed, and perhaps as food for dairy and other cattle.

It has yet to be proved whether any species (likely to be of economic value) will flourish on the tablelands and western plains, and the present one is being experimented with in warm, light, sandy lands, not far from the coast, as pig-feed. These animals certainly eat it greedily, but we have yet to ascertain that it is of real value. Two things have to be proved as regards the so-called Spineless Cactus (the chemical composition of all of them is similar)—(1) Have they any appreciable nutritive value apart from the pickings of the grasses, saltbushes, and other plants on the land where they are cultivated? (2) Will the comparatively high percentage of fibre *all* Prickly Pears contain, whether called Spineless Cactus in the trade or not, be injurious to herbivora?

I reiterate that if you want to grow Spineless Cactus, I do not know a better species than the present one. The spines and spinules have been practically eliminated; in fact, most people say they cannot find any on them at all, and they require the most careful search. But beware of those who tell you that Cactus has high nutritive value, or that they have bred the fishing-line fibre out of it. A net-like, or even sponge-like, arrangement of tough fibre is necessary to support the succulent part of the tissue. Plenty of fibre is necessary to enable the plant to support its own weight or to stand the slightest breeze.

Habitat.—It is a native of Southern Mexico and of Jamaica, according to different authorities. It is widely distributed in the West Indies and tropical America.

It is widely diffused in the warmer parts of the world, *e.g.*, the Canaries and India, but does not appear to be abundant in any locality. For specific Indian localities, Burkill's work, already quoted, may be referred to.

Australian Localities.—In New South Wales I have only observed it in gardens, probably received from the Botanic Gardens, Sydney, originally.

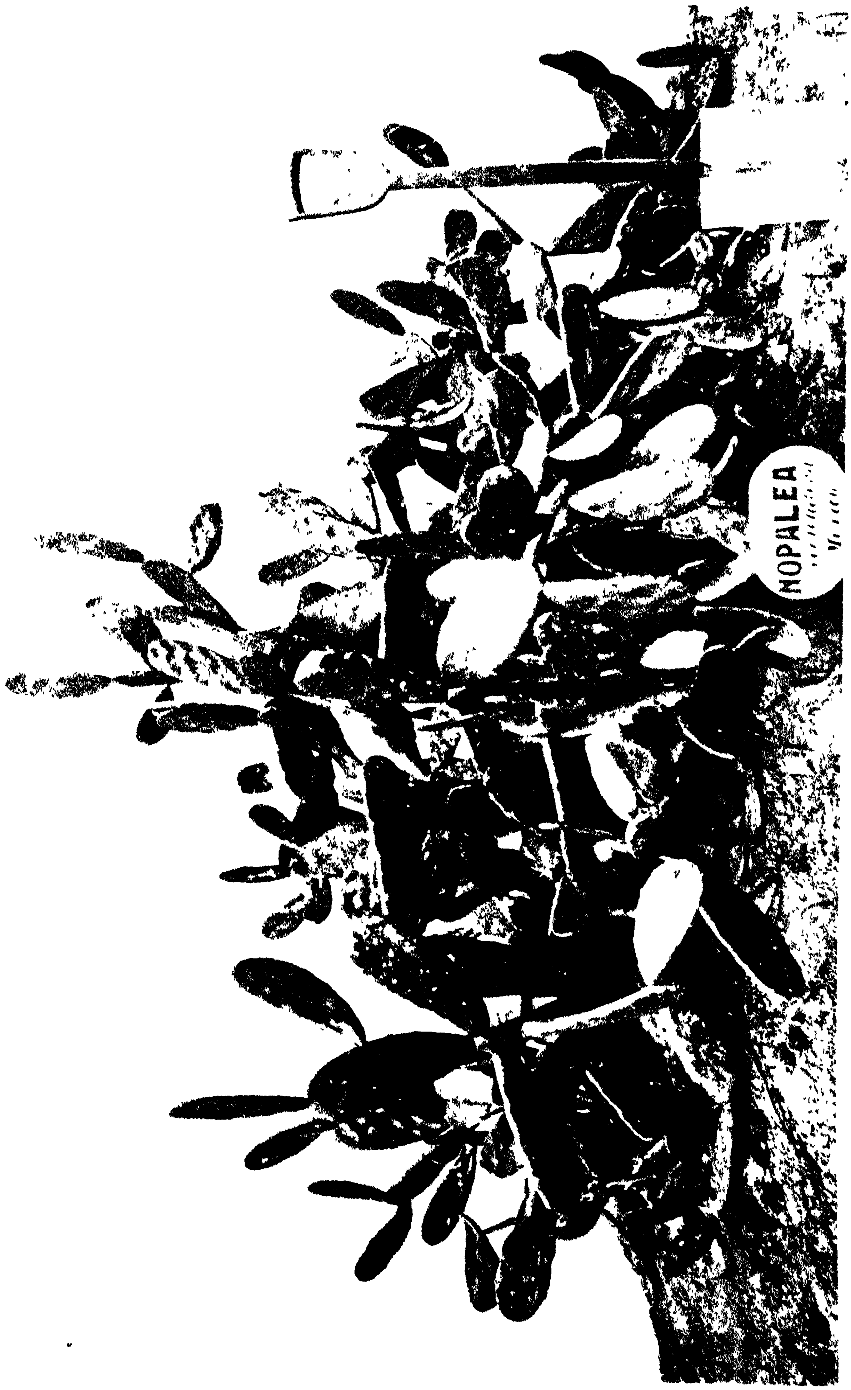
In Queensland it is more widely diffused, but scarce in individual localities, viz., Gayndah, Rockhampton, Emerald. It is not a species of which anyone need be afraid.

Illustrations.

1. Coloured plate.
2. Photograph of a plant in the Botanic Gardens, Sydney.

THE COCHINEAL CACTUS

OPUNTIA NOPALEA [illegible]



Opuntia cochinillifera, **Mill., or** *Nopalea cochinillifera*. **Salm.-Dyck. A Plant in the Botanic Gardens, Sydney**

The Hymenomycetes of New South Wales.

[Continued from page 515.]

J. B. CLELAND, M.D., Principal Government Microbiologist, and E. CHEEL, Botanical Assistant, Botanic Gardens.

1.—*Amanita*, Fries.

"THE universal veil at first completely enclosing the whole fungus, becoming ruptured by the increase in length of the stem, one portion remaining as a volva or sheath at the base of the stem, the remainder usually forming separable scales or patches on the pileus; stem central, its substance usually distinct from the flesh of the pileus, furnished with a ring: gills free. The universal veil is quite distinct from the pileus. Most nearly allied to *Amanitopsis*, which differs only in the absence of a ring. *Lepiota* differs in the absence of a volva. All the species grow on the ground."—Massee's British Fungus Flora.

This genus of agarics is one of considerable importance, containing as it does some species which are extremely poisonous, and others which are edible. Some of its members are brilliantly coloured, and all are more or less striking in appearance. Its characteristic features are white gills, a marked ring on the stem, and a volva at the base of the stem. This latter varies from a sheathing receptacle, into which the stem fits, to mere indications of such a structure, as by a fringe round a swollen base. In addition, it will be found that the gills either do not actually reach the stem itself, or, if they do, that the stem can be easily removed from the cap, fitting into the latter as into a socket. The cap itself is often covered with warts, or scales, or patches, which are really the remains of the volva adherent to the part, the volva having, in an early stage, formed a complete covering to the young fungus. Sometimes the surface of the cap is more or less slimy. So far, only nine species have been recorded from Australia, but in Britain twenty-two are known. Four of the British species are proved to be poisonous, and one edible. Two of the poisonous species (*Amanita mappa* and *A. muscaria*) are recorded from Victoria, and, though not, so far, found in this State, probably occur here also. It will indicate how the study of these fungi has been neglected in New South Wales when we mention that only one of the nine species mentioned has been listed from the State.

The species of *Amanita* are divided into four groups, according to the way in which the volva splits. These are as follows:—

(*a*) Volva splitting at the apex or circumscissile, limb free, persistent. Pileus naked, or with broad membranaceous fragments on the pileus.

(*b*) Volva distinctly circumscissile, margin persistent, the upper portion broken up into thick warts by the expansion of the pileus.

(*c*) Volva very friable, entirely broken up into wart-like scales. Pileus with unequal, mealy patches, which soon disappear, or with small, hard, polygonal warts.

(*d*) Volva almost obsolete, flocculose, entirely disappearing.

Group (*a*).

1. *Amanita vernua*, Bulliard.

Cooke, *Illustr. Brit. Fungi*, pl. 3.
Fries, *Hymenomycet. Europ.*, 18.
Cooke, *Handbook of Aust. Fungi*, No. 3.

"Pileus at first ovate, then expanded, rather depressed, viscid (10 12 cm. broad), white; margin naked, smooth; stem stuffed, equal, floccose, base bulbous (12 cm. long, nearly 2 cm. thick), volva embracing the stem with its free margin; ring reflexed; gills free. Spores 10 x 7 μ. In woods. Victoria, Queensland."—Cooke's Handbook of Australian Fungi, Fig 1.

This species has been recorded for New South Wales by R. T. Baker (*Proc. Linn. Soc. N.S.W.*, vol. xxiv, 1899, 446). We have not met with it ourselves.

2. *Amanita murina*, Cooke and Massee.

Cooke and Massee, *Grevillea*, xviii, 1, pl. 174.
Cooke, *Handbook of Aust. Fungi*, No. 6.

"Pileus campanulate, then expanded, obtusely umbonate, shining, mouse-coloured, nearly naked, margin slightly striate ($1\frac{1}{2}$ 2 in.); stem thin, straight (3 x $1\frac{1}{2}$ in.), whitish, a little fibrillose below, ring pendulous. Volva bulbous, lax, gills free, rather crowded, white, or slighted tinted with rose. Spores 7 x 5 μ. On sandy soil. Queensland, Victoria"—Cooke's Handbook of Australian Fungi.

We have collected a number of specimens apparently referable to this species. The following is a description of one specimen:—

Pileus $1\frac{1}{2}$ in., slightly convex and somewhat umbonate, a pale greyish-brown or mole tint, somewhat streaky, smooth; gills white, moderately crowded, just reaching the stem; stem 3 in., $\frac{1}{4}$ in. thick, slender, deeply rooting, white; veil superior, dependent; volva bulbous, edge jagged; a fresh specimen had no smell, but one which was liquefying had a sour smell, whilst a fresh one, which was being eaten by insects, had a somewhat fœtid smell; spores spherical, 8 to 9 μ. In other specimens, apparently of the same fungus, the cap has been paler, sometimes a light olive, mottled with paler streaks or even straw-colored. The spores are sometimes 7 μ in diameter. Near Sydney in March, after the first rains; at Lower Hawkesbury River in April; Colo, March.

In referring our specimens to *A. murina*, it will be noted that the only definite point of difference is in the spore measurements. Our fungi show slightly larger spherical spores, whilst Cooke and Massee's description shows smaller, more oval spores. Our measurements are based on six separate collections, and as the size of spores varies somewhat, according to age, the difference is not essertial. It may here be pointed out that there is a close general resemblance between this species, *Amanita pantherina* and

Amanitopsis vaginatus. This fact puzzled us much at first. We found specimens resembling each other closely in colour and general appearance, some with marked rings and others with no trace of such. Then we met with a stouter fungus, with a marked ring and broad white patches on the cap, which eventually proved to be *Amanita pantherina.* A reference to the published illustrations of *A. murina* and *Amanitopsis vaginatus* will show that the correct identification of any particular plant will depend almost entirely on the presence or absence of the ring. It seems not improbable that the two species are not really separable, and that *A. murina* is a ringed variant of the other.

Group (*b*).

3. *Amanita pantherina*, Fries.

Fries, *Syst. Mycologicum*, 1, p. 16.
Cooke, *Handbook of British Fungi*, p. 8.
Cooke, *Illustr. British Fungi*, pl. 6.
Massee, *British Fungus Flora*, vol. iii, p. 261.

"Pileus 3–4 in. across, flesh thin, except at the disc, persistently white; convex, then almost or quite plane, margin striate, reddish-yellow or brownish, cuticle viscid, usually ornamented with pale, flat, mealy warts; gills narrowed behind, and free, but close to the stem, broad in front, white: stem 4–5 in. long, ½ in. thick, bulbous, more or less silky or broken up into scales, whitish, stuffed, then hollow; ring distant, usually oblique; volva adnate, the extreme margin only free; spores elliptical.

In woods and in pastures under trees.

Solitary. Pileus 4 in. broad, at first convex, with many flat mealy warts, which rub off with difficulty; then expanded and slightly depressed, glutinous when moist, when dry soft to the touch like kid leather: beneath the gluten are minute fasiculato-pilose scales, but quite adpressed and innate, reddish-grey or brown (according to Fries sometimes livid), margin sulcate and tubercled. Gills broad in front, free, white. Spores round, pure white. Stem 5 in. high, ½ in. thick, stuffed, at length more or less hollow, bulbous, either silky and even or torn into reflexed scales; ring deplexed; volva quite smooth, connate, the extreme margin only free all round. Berk."—Massee. This fungus is regarded as poisonous in Europe.

The description of our specimen (Plate I, figs. 1, 2) is as follows.—Pileus when young hemispherical and slightly striate at the edge, completely enclosed in the volva. Pileus then expanding, convex, becoming even slightly depressed, even, diameter up to 2½ in., portion of the volva remaining sometimes as a thick white crust up to 1 in. across, sometimes as dispersed flakes, colour a very dark olive chocolate, when dry almost black. Not definitely viscid, usually dry, somewhat shining. Gills just free, moderately crowded, white, when young sometimes with a pale fawn tint in certain lights. Hymenophore free. Stem stout, slightly attenuated upwards, nearly 3 in. long, up to ¾ in. in diameter above, bulbous and 1 in. diameter below, white, solid, then slightly hollow, root conically pointed. Ring superior, fixed, white, dependent, marked above with the

lines of the gills. Volva forming a white cup, later indistinct. Shed spores white, nearly spherical or a little elliptical, oblique, apiculate, granular, with a spherical globule, 10·8 to 12·5 μ, in young specimens about 9 μ. On the ground in sandy soil. Hawkesbury River, July; Bulli Pass, April; French's Forest, April; Chatswood, April.

4. *Amanita farinacea*, Cooke and Massee.

Amanitopsis farinacea, Cooke and Massee, *Grevillea*, xviii, 1, pl. 175, Fig. B.
Cooke, *Handbook of Aust. Fungi*, No. 13.

Amanitopsis farinacea was described from specimens collected by Bailey in Queensland (651, 659.) This description is as follows, quoting from Cooke's Handbook of Australian Fungi:—

"White, wholly mealy. Pileus fleshy, convex, then flattened ($2\frac{1}{2}$-3 in. diam.), whitish, sprinkled with erect prominent warts, chiefly at the disc; margin thin, veil adnate, fimbriate. Stem equal (3-4 x $\frac{1}{2}$ in.) without ring, stuffed, white. Volva bulbous, with the free margin crispate; gills free, rather broad, crowded, white, then yellowish, spore globose, 10 μ. On the ground, Queensland."

In collecting this Agaric, which is by no means uncommon round Sydney, we have met with examples corresponding exactly with the above description. In addition, however, to these we have also found examples with a well marked dependent ring, of which Fig. 3, Plate 1, was one, though the ring is hidden from view in the illustration. Still other samples have been apparently destitute of a volva, or of both volva and ring. It therefore became evident that we were dealing with a variable species, which might, according to the specimen found, be placed in one of two, if not of three or four, closely allied genera. Taking the highest form of development as being the most typical, we have, therefore, transferred the species from the genus *Amanitopsis* to *Amanita*. We may add, further, that a comparison of our species with the plate in *Grevillea* can leave no doubt as to the identity of the specimens. The description of our specimens (Plate I, Fig. 3) is as follows:—

Pileus slightly convex, $2\frac{1}{4}$ to $3\frac{1}{2}$ in. diam. Pearly grey, shining, covered with scattered, rather small, conical warts, slightly darker than the rest of the cap. Edge of pileus slightly turned in, often with a frayed edge from remains of the veil. Gills white to pale cream, moderately crowded, just free; stem 4 in. long, solid (hollow in one specimen), $\frac{1}{2}$ in. in diameter below, slightly thicker above, or attenuated upwards, developing at the base into a conical bulb, $1\frac{1}{4}$ in. long, and 1 in. wide. Colour, a mealy white, with a faint fawn tint in the middle. A superior fixed ring, which may be absent. Indications of the free edge of a volva above the bulb, or a volva entirely absent when adult. Spores oval, 9·2 to 10·5 x 6·5 to 9·5 μ.

On the ground in the shade. The Spit, Sydney, April, 1913; Hawkesbury River, May, 1913; Bulli Pass, April, 1914; Sydney, April, 1914; Gladesville, April, 1910; Chatswood, May, 1914.

The species may be easily recognised in the field by its pearly-grey, warty cap, superior ring, and volval remnants at the base of the stem.

(*To be continued.*)

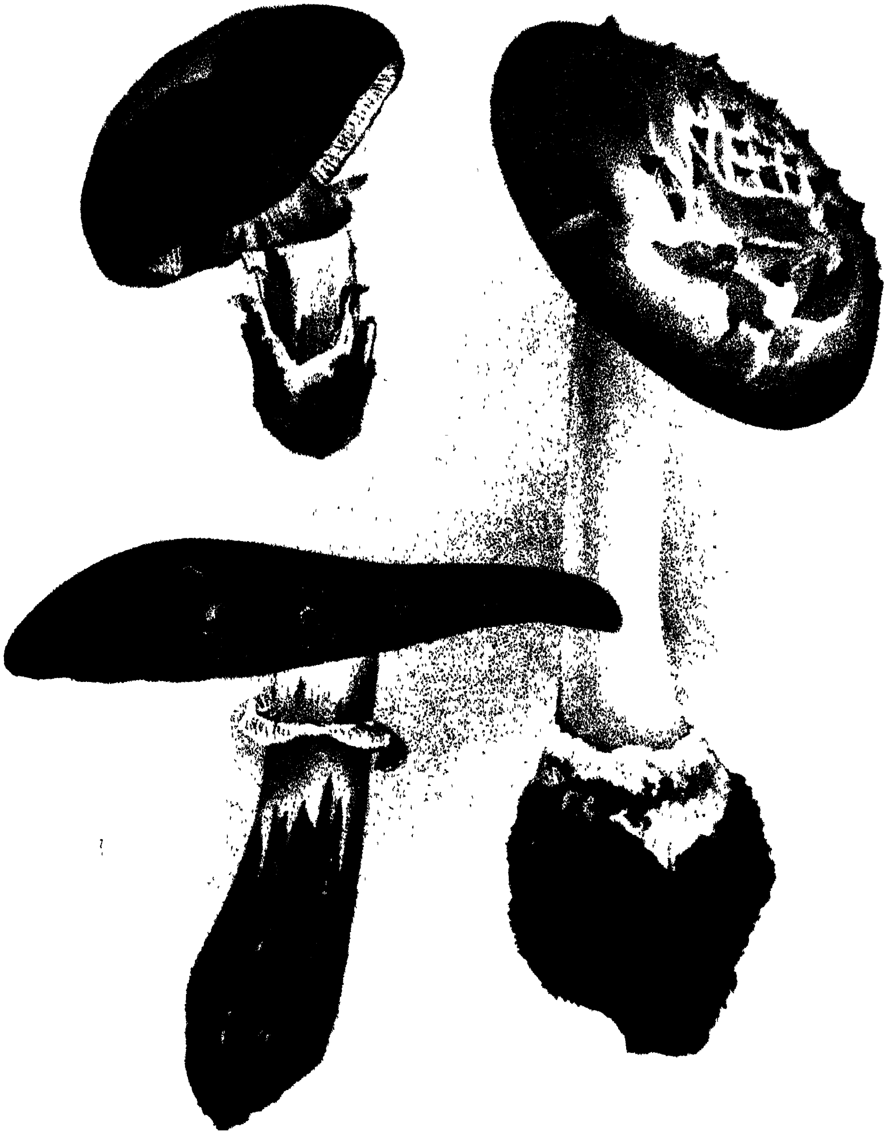


PLATE [illegible]

1 Amanita Pantherina. 2 Amanita pantherina expanding specimen.

3. Amanita Farinacea.

New South Wales Dairy Cattle Records and Standards.

M. A. O'CALLAGHAN.*

THE dairying industry of Australia originated in the Mother State of New South Wales. What is locally described as the "South Coast," comprising the districts of Illawarra and Shoalhaven, was undoubtedly the birthplace of commercial dairying in Australia; though the Camden district, through the Macarthur family, took its share in the early development of the industry. As early as 1832 the State of New South Wales exported butter and cheese of over £5,000 in value.

Early Records.

That the process of selection for breeding purposes by actual performance, occupied the attention of the dairy farmers of Illawarra at an early date, is proved by the herd record books, which were kept by the agricultural societies, notably the Kiama Agricultural Association, which body established a dairy-herd record book in 1883. In fact, as early as 1879 the Kiama association offered prizes for cows with the best weekly records. These records were obtained on the home farms, and their supervision was conducted by the committee of the association. The period of test was a short one, lasting not more than one week, and some remarkable performances were put up by cows specially fed for the time being.

Early Herd-book Standards.

In order to obtain entry into the Kiama Association's herd book, it was necessary that a cow should produce at least 12 lb. of butter or 350 lb. of milk in one week. Some of the following early entries are worthy of note:—

A cow, the property of Mr. Hugh Colley, jun., tested in November, 1883, yielded 419 lb. of milk, producing 18 lb. of butter.

Messrs. Cole Bros.' representative, tested in November, 1883, gave 343 lb. of milk, yielding 13 lb. 4 oz. of butter.

In 1885, as the result of a competition at the Kiama Agricultural Show, a cow, the property of Mr. Hugh Dudgeon, yielded 53 lb. of milk in 24 hours; and another, the property of Mr. H. Fredericks, also yielded 53 lb. of milk.

* Paper read before the Agriculture Section of the British Association for the Advancement of Science, August, 1914.

These figures were exceeded in 1886, when a cow, the property of Mr. Daniel Boyd, gave 58½ lb. of milk in 24 hours; and another, the property of Mr. James W. Cole, put up a record of 59½ lb. of milk for the 24 hours.

These records go to show that, as far back as thirty years ago, the dairy cattle breeders of Illawarra were conducting their business on correct lines, and had put up records of which, at that time, they had reason to be proud. Our present day daily records are, however, considerably in advance of the results then shown. Authentic official tests show that the Illawarra Shorthorn cow, Lily III of Darbalara, gave 72 lb. of milk in 24 hours in October, 1912, whereas the Illawarra Shorthorn cow, Melba III of Darbalara, gave 71¾ lb. of milk in November, 1912, during a 24-hour test.

Present-day Developments.

Despite the fact that the early efforts towards the keeping of systematic cattle records were so promising, no general development regarding the yields of our dairy cattle took place either in New South Wales or in any other part of Australia until within the last couple of years.

Stimulated by a private grant from Mr. A. Hay, of Coolangatta, and assisted by Government subsidy, a Herd testing Association on Danish lines was formed in Illawarra, with Berry as the chief centre. Unfortunately, after six months' work the district was visited by a very severe drought, and the work of the association ceased, owing to a number of the cows that were being tested going dry. This association has not since been revived. The second attempt (at Alstonville, on the Richmond River) to form a permanent herd-testing Association on Danish lines was also not very successful, as after one year's work the society was disbanded. About three years ago, however, the Dairy Branch of the Department of Agriculture seriously undertook the work of organising, and in addition to a couple of associations formed in inland districts, quite a number have been formed and are in full working order on the Tweed and Richmond Rivers, in the northern part of the State. These associations receive Government subsidy to the extent of 10s. in the £ for the first year, and 5s. in the £ for the second year on members' subscriptions. The method of procedure is as follows: –

About twenty-five farmers form an association and appoint a herd tester who has passed a satisfactory examination in the testing of milk. Each herd is visited once a month, and the milk of each cow is weighed. The mornings and evenings' milks are mixed, and an average test obtained. On this, the yield for the month is calculated. The cost of testing comes to about 2s. per cow per year.

The various associations on the Tweed and Richmond Rivers have organised a central council, which body pays a general secretary to do all the important statistical work. At the present time there are fourteen associations affiliated with this council, and the number of cows represented by these associations is approximately 21,000. Outside this council, about 9,000 cows have been tested.

The following table gives the records of twelve months' work for the first five herd-testing associations formed in that district:—

	Byron Bay.	Burringbar	Condong.	Crystal Creek.	Uki.
Number of members	21	22	23	23	22
,, cows tested	1,399	1,546	1,660	1,381	1,516
Greatest number of cows tested by one member	174	199	137	166	183
Least number of cows tested by one member	33	36	37	22	32
Milk yield of best cow for year lb.	11,340	7,455	9,755	6,465	7,170
Average milk yield of 100 best cows lb.	6,593	5,313	5,952	5,123	4,930
Average milk yield of 100 worst cows ... ... lb.	2,232	2,232	2,105	1,943	1,555
Yearly butter yield of best cow lb.	563	431	472	367	361

The comparative differences between the 100 best and the 100 worst cows are sufficiently illustrative to convey to all interested some idea of the money that must be lost annually by retaining in our herds dairy cattle which show such serious annual losses. It may be pointed out, however, that the members of these herd-testing associations are taking active steps to get rid of all the cows that show very inferior records, and we anticipate that in a few years the dairy cattle of the Tweed and Richmond districts will hold their own, in milk and butter producing capacity, with dairy herds in any other part of the world.

Latest Method adopted for Improving the Yields of New South Wales Dairy Cattle.

It must be admitted that the testing of a number of dairy herds, mainly of a cross-bred type, though extremely important work—as it enables the dairy farmer to find out those cows in his herd that are paying and those that are not—leaves something to be desired. Unless we can show him some means of breeding or obtaining on cheap lines a class of cow sufficiently good, not only to pay working expenses, but to leave a reasonable profit, our work ceases to have the effect we are aiming at, namely, the general improvement of our dairy herds. Realising this, and also realising that improvement must come chiefly through the use of better bulls, the writer obtained the consent of the Minister for Agriculture, about two and a half years ago, to organise the breeders of pure-bred cattle in New South Wales, with a view ultimately to obtaining a list of pure-bred cows, whose type and productive capacity will have shown them to be animals which, when properly mated, are capable of producing bulls calculated to produce a better class of cow, on the average, than is met with in New South Wales to-day. This step at once compelled the regular testing of pure-bred cattle on the soundest lines possible, consistent with economy; and, with this object mainly in view, the United Pure-bred Dairy Cattle Breeders' Association of New South Wales was formed.

Records of Pure-bred Dairy Cattle.

In July, 1912, representatives of the principal pure breeds met and drew up a code of rules for the testing of pure-bred cattle, and arrangements were entered into with the Department of Agriculture to have the work done by officials of the Dairy Branch, in order that the authenticity of the work would be placed beyond question. The method in force is as follows :—

A breeder fills in a requisition, showing the number of cows he requires tested, giving, at the same time, the pedigree and herd-book number of all such animals. This request is accompanied by the fee of 5s. per cow, which is the amount charged for a lactation period. The official pays a monthly visit to the herd, sees the cows milked out before the test begins, and then weighs and tests the morning and evening milks separately for one day. From this data the yield for the month is calculated. The lactation period decided on is 273 days, this being, in the opinion of breeders, wisest in the interests of the future progeny of those animals under test; but there is nothing to prevent any breeder obtaining a twelve months' record of his cow, if he so desires. This scheme has worked very satisfactorily up to date. The chief difference between this and other official or semi-official methods used in some countries is, that no notice is taken of any records kept by the farmer or put up by the cow other than those taken by the official representative; and, though it is seen that the cows are only tested on one day a month, still it has been clearly shown that, when compared with the actual daily milk records of cows in normal health, the variation between the records as estimated from the monthly data, when compared with the total daily records, is indeed very small, and quite unworthy of going to the expense of recording the milk daily. On this point I should like to draw attention to the fact that, if the butter result is the chief requirement, there is no advantage in weighing the milk of each cow daily unless that milk is also tested for butter fat, because the variation in butter fat is greater than the variation in milk yield; and it is certainly not wise to credit a cow with a large milk yield for a part of the month, and then estimate the butter yield from those milk yields by a butter fat test taken on a date on which the cow yielded probably 5 lb. less milk than on some days on which she was credited with a high milk yield and a correspondingly high fat test. The New South Wales method makes it impossible for any breeder of an unscrupulous nature, should there be one, to show any untrue records for any particular cow or cows. I have recently seen it stated that the butter factory returns are a sufficient check on the milk yields returned by dairy farmers, but this is an evident misconception, because a man wishing to show high records for a few special cows would only have to make a corresponding decrease in the yields of other cows of a family that he did not care much for, in order to make his total figures agree to a nicety with the butter factory records. As there are large prizes in the shape of big prices for bulls from high-yielding mothers, it is certainly not advisable to leave any loophole for the action of possibly unscrupulous persons.

Present Day Standards and Records.

The following data in reference to pure-bred cattle that have completed their records for one lactation period should prove of interest.

Testing under this scheme began in September, 1912. The number of cows whose tests had been completed, up to the 30th June, 1914, was 424. Of these, 337, or approximately 80 per cent., attained to the standard laid down, which now is:—

For cows 2 years old at beginning of test	...	200 lb.	butter.
" 3 " " "	...	250	"
" 4 " or over " "	...	300	"

Forty-two cows dropped out of the test for various reasons, and forty-five of those that completed the period, failed to reach the standard.

TABLE A.—Showing Average Yield of Standard Cows according to Breed.

No. of Cows.	Breed.	Average Yield.		Period.
		Milk.	Butter.	
		lb.	lb.	
258	Jersey	4,950	289	273 days.
68	Shorthorn	7,274	335	273 ,,
10	Guernsey	5,300	287	273 ,,

The average yields of all cows that completed a lactation period were—5,184 lb. milk, and 284 lb. butter.

In addition to the above cows, one Holstein tested for 273 days gave the following result:—Milk, 14,614 lb., and butter, 542 lb.

Of the forty-five cows that failed to reach the standard, forty-three were Jerseys, one was a Shorthorn, and one a Guernsey.

TABLE B.—Showing Comparative Yields and Butter Values of Standard Cows, dividing the total number into four sections according to merit.

	Average Yield of Butter.	Value at 10d. per lb.		
	lb.	£	s.	d.
84 best (that is 25 per cent. of total)	405	16	17	6
84 second best ,, ,, ...	306	12	15	0
84 third ,, ,, ,, ...	264	11	0	0
84 fourth ,, ,, ,, ...	223	9	5	10

As the figures show, so far as numbers go, Jerseys dominate the situation. Shorthorns were not tested in numbers representative of the breed, whereas the Guernsey breeders have only begun to be tested; and, apart from this, the number of pure-bred mature Guernsey cows in New South Wales altogether is probably not more than about 150.

None of the records of cows owned by the Department of Agriculture and kept on State farms are included in these figures; but in future it is intended to have them submitted to the same scheme of testing. Of course, private records of these cattle are taken daily for comparative purposes.

It will be interesting to note that the twenty-five best Jerseys yielded 452 lb. of butter, with a money value, at 10d. per lb., of £18 6s. 8d. each; the twenty-five best Shorthorns yielded an average of 417 lb. of butter, with a money value of £17 7s. 6d. each; while the ten best cows of all breeds showed an average of 556 lb. of butter, with a money value of £23 3s. 4d. per head.

The ten best Jerseys averaged 503 lb. of butter, with a money value of £20 19s. 2d., and the ten best Shorthorns averaged 487 lb. of butter, with a money value of £20 5s. 10d. each.

TABLE C.—Showing the particulars of the breed and yields of twelve cows which completed a twelve months' milking period.

Breed.	Name.	Yield. Milk.	Yield. Butter.
		lb.	lb.
Jersey	Leda's Snowdrop (imp.)	11,886	796
Shorthorn	Lily III of Darbalara	17,599	689
"	Melba III "	15,239	653
Jersey	Madeira VIII	8,348	616
Shorthorn	Slipper of Darbalara	12,307	581
"	Sybil "	12,324	579
"	Posey "	10,156	529
"	Camellia II "	12,039	524
"	Dolly IV "	12,052	485
"	Daisy VI "	8,255	440
"	Madame VI "	8,582	433
"	Daisy II "	8,394	404

The Guernsey cow, Merton Margaret II (imp.) is completing a twelve-months' record, and in eleven months has given 659 lb. of butter and 9,882 lb. of milk.

The Standard Cow.

By a standard cow I mean an animal whose productive capacity is such that she will pay her way to the extent of the labour involved at current rates, and at the same time make a return of at least 5 per cent. on the capital invested. From carefully compiled returns I estimate that, at the rate of wages now prevailing in New South Wales, a cow will have to return a minimum amount of £7 11s. 10d. per year for butter value in order to meet engagements in the way of labour, rent, and interest on money invested in the necessary plant to run the farm. This would mean that a cow would have to produce the minimum amount of 182 lb. of butter (or, say, 425 gallons of milk), the average net value to the farmer for same during the past five years being 10d. per lb. (assuming that the quality was first class).

The amount obtainable from sources other than butter may be put down at the present time at about £1 17s. per cow. This includes the income derivable from the use of separated milk for pig feeding, and also from the money obtained for the sale of young stock of ordinary breeding, as well as other incidentals, such as the sale of culled cows. This means that a farmer milking, say, fifty cows, should, in gross returns, obtain an average of, approximately, 9 guineas per head in order to pay all charges consequent on the working of the farm. Fortunately for most dairy farmers, they are in a position to get a certain amount of cheap labour through their own families, and thus they can show a profit on cows below the average standard here referred to.

Bull Pedigrees.

It is impossible for any close observer to analyse the figures given without coming to the conclusion that a pedigree showing the descent of a bull for three or four generations is not, in itself, sufficient for the dairy farmer who wishes to increase the productive capacity of his herd. From experience gained in cattle breeding, as well as from observations made on the yields of pure-bred cows, I have come to the conclusion that no pedigree of a bull of any dairy breed is complete, unless it shows the milk and butter yields of his dam and, if possible, of his sire's dam; and the question is raised as to whether it should not be compulsory for any person who sells a pure-bred bull on appearance and pedigree to include in that pedigree, as a minimum, the yield of one dam. Farmers would then be in a position to know something really definite about what they were buying, and breeders would be compelled, by force of circumstances, to retain bulls of only good cows.

Improvement in Dairy Records in New South Wales.

For the ten years ended 1911, the dairy cattle of New South Wales showed an increase of 78 gallons per head. Estimated at 6d. per gallon, the value of the whole milk, this increase represents a sum equal to £1,245,123. Not only has there been an improvement in the milk yield per head, but thanks to the general introduction of Jersey and Guernsey blood, the quality of the milk has been improved; for whereas it took 2·56 gallons of milk to make a pound of butter in 1902, it took only 2·35 gallons of milk to make a pound of butter in 1911. Taking my idea for the minimum of a standard cow, namely, 425 gallons of milk, or 182 lb. of butter, the average of the State is still unsatisfactory; and it will take years of patient work on behalf of all concerned to bring our average up to the required standard.

The Illawarra Shorthorn Cattle.

As the Illawarra Shorthorn is the only one of our dairy breeds referred to with which visitors to this country are not conversant, a short history of the breed may be given. As the breed was established before I came to this country, the Manager of the one of the most successful stud of Dairy Shorthorns in Australia, namely, Mr. J. T. Cole, of Darbalara, was asked for a brief outline of the early development of this breed.

A Short History.

"The cattle in the Darbalara Stud go back in an unbroken line to the old type of Shorthorn or Durham of seventy years ago, before the breed was specially developed for 'beef' purposes. At that time the Shorthorns were noted for their splendid dairy qualities, as well as for their beauty of outline, perfection of symmetry, and general excellence, in all countries where they have been introduced.

It was natural that settlers in Illawarra, who had to depend on dairying for a livelihood, valued these old Shorthorns very highly for their great producing qualities. Generally speaking, they were robust cattle with good capacity, easy to milk, of very docile disposition, and, therefore, in every way suited to the requirements of the early settler.

Some of the best of these early Illawarra Shorthorns were imported by local pioneers, such Henry Osborne, Terry Hughes, J. R. Lomax, and Captain Johnstone. Others were drawn from the herds of the A. A. Company, the Twofold Bay Company, the Lee's of Bathurst, the Lowe's and Cox's of Mudgee, and many others. In fact, nearly all the good Shorthorn herds in this State in those early days contributed good material to build up the dairy herds of Illawarra. Undoubtedly, the herd that played the most important part in this work was that of Mr. Henry Osborne. His breeding operations were very extensive, and the young heifer calves when weaned were sent inland, on to the Murrumbidgee, near Gundagai, until they came near calving, when those not required for Mr. Osborne's own special use were disposed of to the local settlers for dairying purposes. Mr. Osborne was dairying himself in a large way. His cattle were exceptionally heavy milkers, and for years his HO brand was accepted as an absolute guarantee of high-class dairy quality and good breeding.

Among the many other breeders who established good stud herds, were Mr. A. McGill, of Albion Park, and Mr. Evans, of Penrose, Dapto. Mr. McGill followed the practice of line breeding his own sires from the best cows he could command, either in his own stud or by purchase, and succeeded in developing a very exceptional herd, which was dispersed about 1869. To this day the descendants of his herd will be found among some of the best of high-testing Illawarra Shorthorns.

Mr. Evans and his son—the late E. R. Evans—of Penrose, Dapto, had also an exceptionally good herd, and early in the 60's, he introduced the famous imported bull Major to Illawarra. No individual animal has done so much in maintaining the old type of Dairy Shorthorn as Major. He was very prepotent, and this quality his descendants inherit down to the present day. He was a low-set bull of medium size and good outline, with deep roomy body, well sprung ribs, broad flat thighs, and a good flank. His head, neck, and shoulders, though masculine, were fine, and his general appearance "milky" looking. In colour he was a good light roan, and he had an exceptionally soft, mellow skin.

Major was the last imported Shorthorn bull in Illawarra that can be said to have sired uniformly good milkers. His sons were very largely availed of

as a change of blood all through the district, and, when heifers by them came into milk, the Majors became very popular.

In the course of time, about the early 70's, the long-pedigreed modern Beef Shorthorn cattle were introduced for the first time into Illawarra, and given a brief trial for dairying purposes, which ended in failure. The Major bulls then became more popular than ever before, and line breeding with bulls of this strain was largely followed, and has been satisfactory down to the present day to those who have adhered to it.

Several bulls, bred in Illawarra, with varying degrees of this Major blood, have been used to mate with our Banker cows, the most successful of which have been Heather (No. 27, M.S.H.B.), Musket II (No. 43, M.S.H.B.), Abram (No. 1, M.S.H.B.), and Combat of Coleville (No. 163, M.S.H.B.). The last-named bull was bred by my brother, J. W. Cole, of Coleville, Jamberoo, from stock on his dam's side that have been in our family for half a century. With the exception of this bull, none have been obtained from outside sources for use in our herd since it was first founded.

From first to last my aim has been to keep our cattle true to the old type of Shorthorn, and free from intermixture of the pedigreed "beef" Shorthorn or any other foreign strain of blood. A long experience has taught two things that are essential for the general improvement of dairy stock—that is, purity of breeding combined with careful testing of the cows, and the rejection for stud purposes of inferior producers, no matter what their breeding may be.

In selecting stud cows as foundation stock my first aim was to secure the purest of the old type of Dairy Shorthorn available, with the pronounced dairy points and character that go with this grand old strain.

Other points considered essential were fineness of fore-quarter and bone, depth of rib and body, good udder formation both before and behind, with good teats, and the soft, mellow, orange-tinted skin of a Dairy Shorthorn showing prominently round the eyes, in the ear, and on the escutcheon and udder and other parts devoid of much hair."

Seed Testing for Farmers.

The Department is prepared to test vegetable and farm crop seeds. Reports will be given stating the germination capabilities of the seed, its purity, and the nature of the impurities, if any.

Communications should be addressed to the Director, Botanic Gardens, Sydney. Not less than 1 ounce of small seeds such as lucerne, or 2 ounces of large seeds like peas, should be sent. Larger quantities are to be preferred. Seeds should be accompanied by any information available as to origin, where purchased, age, &c.

If a purity report only is desired, it should be so stated, to secure a prompt reply. Germination tests take from six to twenty days, according to the seed.

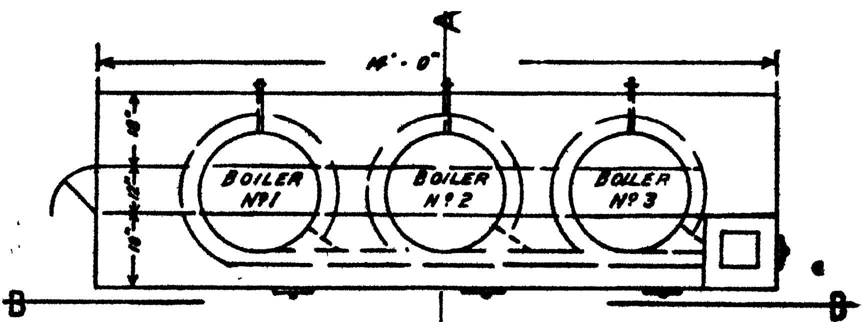
Cooking-boilers on Poultry Farms.

JAMES HADLINGTON, Poultry Expert.

It may not be generally known by beginners in the poultry business that if offal of any kind is boiled for the purpose of feeding poultry or pigs, or in fact boiled for any purpose, the Board of Health regulations require a steam-tight lid to be in use on the boiler. It is also necessary that a licence be taken out, and the application for this must be made to the Municipal or Shire Council, as the case may be. Printed forms for the purpose are issued by them.

Inquiries have been received on the subject of steam-tight lids and cooking-boilers generally, and one correspondent requested information on the practicability of setting three boilers in line operated by one flue.

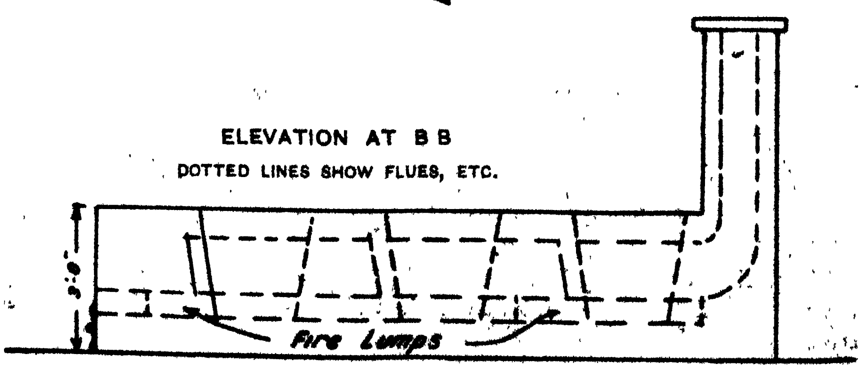
The accompanying diagrams indicate the way in which this may be accomplished.



PLAN

ELEVATION AT B B

DOTTED LINES SHOW FLUES, ETC.



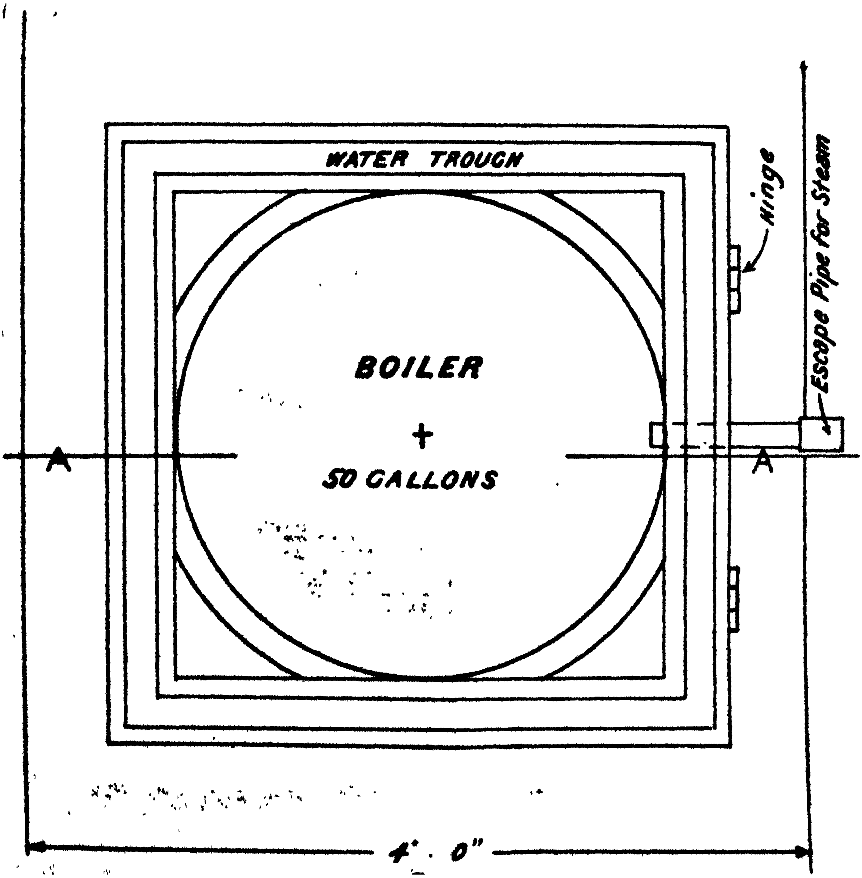
It might appear that a steam-tight boiler is somewhat expensive; but where fuel has to be bought, the use of a steam-tight lid is most economical, and saves its cost many times over.

The following description of the construction of three 50-gallon boilers, arranged to be served by one fire, and also of a steam-tight cover, is supplied by Mr. A. Brooks, Works Overseer to the Department.

The flues are provided with separate dampers, together with soot or cleaning-out doors. It should be noted that water must be in each of the boilers at all times when firing, whether using one or more, as the fire passes under each.

To form a good crown under the fire-hole and a seat for the boilers, 18-inch baker's fire lumps are used, set on the same level as the boilers.

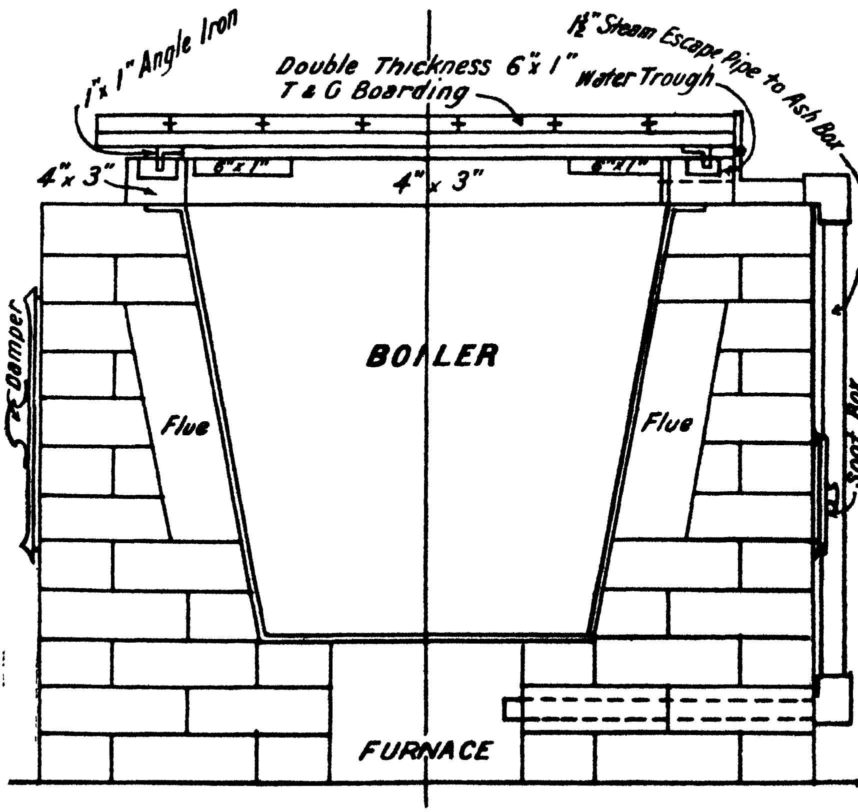
The flues may be as shown, with the bricks cut to give an equal width of flue, or the bricks may be left straight, which would reduce the top of the flues to, say, 2 inches, the dividing-wall between the boilers being 9-inch straight on each side.



PLAN OF STEAM-TIGHT COVER.

The steam-tight covers shown have a frame of 4 in. x 5 in. hardwood, made to take in the three boilers, and bolted down. In each separate frame a 2 in. wide x 1¼ in. deep groove is made, to hold water, and on the underside of the lid is fixed a 1 in. x 1 in. galvanized angle iron, to dip into the water and form a seal. The lids are made of 6 in. x 1 in. redwood T. and G. boarding, copper-nailed to similar Baltic boarding, both being secured with galvanized bolts to 6 in. x 1¼ in. ledges, and hinged to frame with brass butt hinges, as shown.

The steam-escape pipe is fitted through the frame, and carried down and into the ash-pit under coppers.



SECTION AA

DETAIL OF LID TO COOKING-BOILERS.

Seasonable Work for Poultry-keepers.

JAMES HADLINGTON.

OCTOBER.

FOLLOWING up the indictment against late hatching in last month's Notes, I again wish to emphasise that the end of this month should see the last batches of chickens out for this season, in any part of the State, while in the warmer parts the middle of the month is quite late enough to finish up. Almost every breeder of standing is accustomed to make the annual resolution that there will be no chickens hatched out for him or her after the middle of October. But invariably the end of the season finds one with a less number than was set out to hatch, and one is tempted to go on a little longer. If this is the case with breeders of long standing, how much more so with those not having had the bitter experience of late spring-hatched chickens? The beginner cannot understand why his chickens should not do at least fairly well if they hatch out strong, and if every precaution is being taken in rearing and giving plenty of shade, with hygienic conditions, during the summer months. This is the method of reasoning generally adopted by the inexperienced; but the whole argument is based upon wrong premises, and to make the "why" and "wherefore" clear, it is necessary to follow the life-history of the late chicken. The troubles of these late-hatched chickens usually commence after they are 6 to 8 weeks old; prior to that time the moderate amount of hot weather usually experienced to the end of November or middle of December is not only borne fairly well, but for the most part it suits them up to the age mentioned. But after that age not only do they not require so much heat, but they become lethargic and inactive under it; hot weather is no more conducive to energy in the chicken than in any other form of life, and this is where at least one of the troubles start. The chickens bask inactively in the shade almost the whole time between feeds. This inactivity, coupled with the lowering effects of the heat, not only has the effect of dulling their appetites so that less feed is consumed, but their strength is being sapped at the same time; therefore, the growth of the chickens at this tender age is stunted, and loss of vitality is the result. A lowered vitality, as is well understood, predisposes them to disease, hence the known susceptibility of late-hatched chickens to roup, chicken-pox, and almost all the diseases and enemies of the poultry yard. The trouble, however, does not end here, even if they escape disease during the autumn months. What happens is this: The chickens that have become stunted in their early growth invariably put on a little spurt, so to speak, when the cooler months of April and May come in, and the pullets make some signs of a recovery to normal. At this stage the cold snaps of winter begin to be felt, and very soon a shrivelled-up appearance is noted; they have sustained another check, this time from the cold, and the result is that

no good is obtained from them perhaps before August. In the meantime, in most cases, from 30 to 50 per cent. have been lost, and what is worse, they have been a menace to the whole flock of growing stock on the farm. After all these troubles, what are left are usually 25 per cent. worse layers than the earlier hatched ones, and they are never fit to breed from.

Another feature in regard to late hatching this year is, that in all probability high prices will rule for feed-stuffs during the next twelve months. This is an additional reason why the unprofitable factors should, as far as possible, be eliminated from poultry-keeping, and the late-hatched chicken is, with very few exceptions, one of these.

If it is determined to have more chickens out, rather than prolong the hatching season it is much better and more profitable in every way to stop now, and start again setting eggs from the middle of January, so that the first batches will come out about the first week in February. Chickens hatched out from that time on to the middle of March invariably do well, the reason being that the hot weather of February and March suits the very young chickens up to the age of 6 to 8 weeks. By that time the weather has cooled down sufficiently to enable proper development to proceed, and it will be found that the chickens so hatched will rear better, and will quite catch up to the very late spring-hatched chickens in development, and without risk of half the loss. At least two months' feed will also have been saved.

But it should be understood that I am not advocating this summer hatching as a means of producing layers, because they will be found much on a par with the late spring-hatched chickens in that respect; but an advantage is gained in the cockerels for table purposes, which is not the case with the late spring-hatched ones. Another thing to be borne in mind is that it is not advisable to run a continuous stream of chickens over a limited area of ground. Therefore, in making the arrangements for the season's work, all these factors have to be taken into account.

Cleaning-up.

A thorough cleaning-up of the incubators, &c., after hatching should not be neglected. Poultry-keepers, on the whole, are not as particular as they might be in matters of this kind. The tremendous amount of detail that has to be attended to during the rearing season is quite recognised, and it is no wonder that some things get neglected; but it is surprising what mind-concentration can do in matters of detail. It is important that the incubators should receive a thorough cleansing. All excrement should be scraped off the drawers or woodwork, and everything thoroughly washed. They should then be allowed to dry, and afterwards sprayed out with a disinfectant, either 2 tablespoonsful of formalin or 5 of carbolic acid to the gallon of water, makes a good spray for the purpose. The heater portions should be thoroughly cleaned, all flues brushed out, lamps also should be emptied, the cotton wicks thrown out, and the burners boiled in water to which a small quantity of caustic soda has been added. The machines will then remain sweet and clean, and be all ready for next hatching season when it comes round.

Preserving Eggs.

Eggs will continue to be plentiful, consequently cheap, until the end of this month, when from that time on there will be a diminution of the quantity laid, and prices will harden accordingly. Therefore, now is the time to preserve for use during the scarce period. Apart from cold storage, there is probably no preservative which gives such uniformly good results as water-glass (silicate of soda). Brands of this chemical are put up in various sized tins, and are mostly obtainable at general stores. Instructions how to preserve eggs with it are usually supplied with the tin; but for the benefit of readers who may not be able to obtain it in this way, or who are not conversant with this simple method of preserving eggs, the following instructions and points on using this preservative are given. A handy vessel for storing in is the empty kerosene tin, and the fact that only about 200 eggs are then in one lot (when the tin is not too full), is a recommendation for its use. Any wood, earthenware, tin, or enamel vessel may be used, but it should not be of iron, as it will rust.

The strength generally recommended is 5 per cent., or 1 part of water-glass to 20 of water. The water must first be boiled, and the solution is more easily made by thoroughly mixing the chemical while the water is hot; it should then be allowed to get cold before the eggs are put in. The method of procedure is to fill the vessel one-third full of the preservative made as above, as this allows the vessel to be filled up with eggs without running over. A good plan is to have a thin board, the size of the vessel, to float on top of the water, so that the eggs can never rise to the surface and get exposed.

It should be understood that eggs that are at all stale will float on account of the enlarged air space, but perfectly fresh eggs (and it is in this state only that they should be preserved) should not float, and if they do in any number it is a sign that the solution is too strong and needs to be diluted. When this has to be done the whole should be well mixed again. The vessels containing the preserved eggs should then be put away in a cool place, and inspected now and again to see if evaporation has occurred to such an extent as to require more solution. Should this occur, it should be made up as in the first place, and the containing vessel filled sufficiently to keep the eggs thoroughly covered. Needless to say, only known perfectly fresh clean eggs, free from fractures and weak places in the shells, should be put into the preservative. Great care is necessary in putting the eggs in the solution to prevent cracking, as every cracked egg will go bad and endanger the remainder.

Cooking preserved Eggs.

When eggs have been preserved in water-glass the shells become very brittle, and if it is desired to boil them a pin point inserted into the large end will be found to materially reduce the liability to crack. They should also be gradually brought to a boil, instead of dropping them right into boiling water. When eggs are taken out of the water-glass they should be washed in water before cooking.

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

REPORTS AND NOTICES FROM BRANCHES.

Albury.

"Maintenance of Soil Fertility" was the subject of a lecture delivered by Mr. H. C. Stening, Inspector of Agriculture, to the members of the above branch, at Lavington, on 28th August. Mr. Wells, Chairman of the branch, presided.

MAINTENANCE OF SOIL FERTILITY.

Mr. Stening defined fertility as meaning the producing power of the soil; thus the term did more than simply imply the richness of the soil in plant food. Apart from climatic conditions, the texture of the soil was the most potent factor in producing a fertile soil; all the necessary plant food for crop production might be contained in a brick, but it was of no value as food for plants. A soil was in good texture or "good heart" when it "worked up well," in which condition it provided the most favourable medium for root action and the supply of air and water to the roots.

The maintenance of soil fertility was the most important problem in agriculture, and given favourable climatic conditions it was largely a question of good farming; in fact, farming that did not include methods to maintain fertility was not worthy of the name; it should rather be termed "soil-mining," for it was simply robbing the soil of its wealth.

If the small amounts of plant food taken from the soil were compared with the tons upon tons shown by analysis to be contained in average farm soils, the latter should produce bumper crops for hundreds of years without adding fertilisers; but much of this plant food was unavailable or "locked up" in distasteful or insoluble compounds. All plant food must be in a soluble condition in order that it might be absorbed by the plant roots, and therefore it was this soluble plant food that was of real value to plants, and the gradual decrease in yields on soils that had been cropped for years was frequently due to the exhaustion of the available plant food.

Fertilisers were applied to supplement the plant food in the soil to such an extent that maximum crops might result. The producing power of a soil was measured by the amount of the essential plant food which was least abundant. Experience had proved that phosphoric acid was the element most likely to be deficient in most of our soils, and crops responded to the application of phosphatic manures more than any other. The reason that nitrogenous manures were not so necessary as in England was that our climate was favourable to the production and retention of nitrates. Sufficient warmth was supplied for the development of soil bacteria, which converted unavailable organic nitrogen into soluble nitrates, which, owing to the low rainfall, was not readily leached out of the soil. Other conditions necessary for the growth of the nitrifying organisms were air and moisture which were largely controlled by judicious cultivation. Tillage also tended to increase fertility by promoting weathering, and thus fining the soil and converting dormant plant food into a form available for plants. Pulverising the soil increased its water-holding capacity and capillarity, and gave the plant roots a greater foraging area for water and food.

One of the most important constituents of fertile soils was "humus," or decayed vegetable matter. It supplied food for bacteria and the organic nitrogen for conversion into nitrates. It also increased the power of the soil to absorb and retain moisture, but probably its greatest value was its effect on soil texture. The humus content of soils gradually became depleted under cultivation, as exposure to hot dry air caused it to be burnt up. The decay of all animal and vegetable substances furnished humus, and on small farms, farmyard manure was a valuable source; but on large areas the most economical method of supplying organic matter was by "green manuring," *i.e.*, the ploughing under of crops. Weeds and natural herbage might be turned to good account, but usually a special crop must be grown, such as rape, barley, cowpeas, &c. Leguminous crops had a special value for this purpose, in that they possessed the power of utilising the free nitrogen of the air, by the aid of certain bacteria which lived in the small nodules on the roots of these plants. It was not always necessary or practicable to plough down the entire crop, but when fed off, the soil derived from 80 to 90 per cent. of the full manurial value of the crop, while the farmer secured full value for the feed.

Rotation of crops was also a great factor in maintaining fertility by reason of the fact that the soil was not subjected to a continuous drain of plant foods in the same proportions;

and owing to some plants possessing deeper rooting habits than others, the plant food was not continually extracted from the same area. The keeping of stock was one important means of assisting to maintain fertility.

The action of lime in producing better crops was generally recognised to be indirect; in particular it improved the texture of the soil, especially heavy clay soils, rendering them more porous and more easily worked. It also acted chemically in setting free dormant plant food and in sweetening sour soils. Some crops, such as lucerne and clovers, produced inferior crops on sour soil, and if the acid were neutralised by adding lime, the soil became more productive. An acid soil was also uncongenial for micro-organisms, and lime supplied the conditions necessary to allow them to carry out their functions.

Liming tended to a more rapid oxidation of humus, and therefore liming alone soon resulted in soil exhaustion. Manuring and green manuring should therefore be practised in conjunction with liming.

QUESTIONS.—At the conclusion of the lecture a number of questions were asked, principally in reference to applying lime. A few of the questions and answers may be quoted:—

Question.—Would an application of lime benefit grass land that had recently been drained?

Answer.—Most decidedly, for undrained land was always sour, and an application of lime after draining would sweeten the soil and improve the quantity and quality of the pasture. It was the general experience that after an application of lime more nutritious herbage, such as clovers and trefoil, sprang up.

Question.—What quantity should be applied in this case?

Answer.—As the growth of sorrel was an indication that even the well drained land in the district was deficient in lime, recently drained land would probably be very acid, and an application at the rate of 1 ton per acre could be recommended.

Question.—In applying lime for a crop, should it be ploughed in?

Answer.—As lime readily sinks into the soil it should not be ploughed in, but after ploughing, it should be evenly spread and then harrowed in.

Question.—Should manures be mixed with the lime?

Answer.—Manures should not be mixed with lime, particularly nitrogenous manures, as a loss of nitrogen resulted. It was preferable to apply the lime at least a month before sowing and manuring. This would also allow the lime to become thoroughly incorporated with the soil.

A vote of thanks to Mr. Stening was moved, and carried by acclamation.

Canadian.

The monthly meeting of this branch was held on the 8th August, Mr. R. Hollow presiding.

Mr. Taylor gave a black-board demonstration upon how to measure and calculate the tonnage of hay in a stack. He had three kinds of stacks drawn upon the board, viz., an oblong stack with gable ends, an oblong stack with bevelled ends, and a round stack. Mr. Taylor went to considerable trouble to explain the methods of calculating the tonnage. When the farmer has calculated the approximate number of cubic feet of hay in his stack, he should divide this by 250 with old hay, and by 350 in the case of new hay; the answer will be the tons of hay in the stack. A farmer should know the quantity of stuff he has when selling the stack in bulk, in order to know whether he is being paid for the right weight.

A hearty vote of thanks was accorded Mr. Taylor for his advice, and also Mr. Campbell, who read an interesting paper on "Manures and Manuring."

Coradgery.

The visit of the Sheep and Wool Expert of the Department of Agriculture, arranged by the Coradgery branch, had been looked forward to with more than usual interest.

MERINOS AND CROSSBREDS.

On 15th July, the flocks of Messrs. H. and A. Balcombe and Mr. T. Frecklington were inspected and the following day was spent at Wombin, where a representative gathering of members attended. Mr. Whitmill had at considerable trouble yarded a fine lot of Merino sheep. The morning was devoted to classing and selection of Merino flocks, and Mr. Mathews strongly advocated for the district a Merino sheep carrying a medium class of wool of good length, and suitab'e for combing purposes. He was emphatic in advising breeders to stick to plain-bodied sheep, contending that the animal was hardier, matured quicker, and retained its hardier constitution better than those carrying wool of a finer

description. He pointed out that breeders would obtain their ideal by encouraging length of staple, rather than breeding in the direction of density and fine wool. With increased demand for a serviceable class of wool, he considered the more robust wool, which the district was capable of producing, more profitable than the fine wool, despite the fact that fine wools are relatively more valuable on a basis of price per lb., than wools coarser in quality. In establishing a flock, the first object of the breeder should be to consider the type of sheep best adapted, not only for the district, but also for the particular locality in which he may be situated. Once having decided on the class of animal, his object thereafter should be to stick to the type and not attempt to follow the vagaries of fashion. The necessity of culling and classing the ewes suitable to the different rams was also demonstrated, and the advisability of selecting rams from reputed breeders, and of a reliable type was also emphasised. He strongly condemned mixing up different strains of Merino, which by careful breeding and selection have now obtained distinctiveness of type.

During the afternoon Mr. Mathews delivered a lecture on "Crossbreds and the raising of Fat Lambs." The district, while suitable for the breeding of a profitable class of Merino, was, nevertheless, adapted for crossbreds. In fact there were few districts in New South Wales where the crossbred and Merino could be developed side by side to better advantage. Whilst, however, the Merino was more adapted for natural conditions, he thought that settlers who combined sheep raising with wheat-growing, could do better with crossbreds, and when more up-to-date methods were adopted, such as the growing of fodder crops in conjunction with the general methods now practised, the farmers would find their sheep branch almost, if not quite as remunerative, as wheat-growing. There were different ways in which the sheep might be combined with present methods of cultivation. Even taking the quantity of feed growing spontaneously on the areas temporarily out of cultivation at this period of the year, there was sufficient at the lowest estimate to carry two ewes with lambs at foot to the acre. How many more then could be carried if this supply were augmented by the growth of fodder crops, which it had been proved could be grown with success? The crossbred was essentially a farmers' sheep, and could be used to better advantage where there was a liberal allowance of coarser classes of food for consumption. The crossbred should, however, never enter the province of the Merino, and he advised breeders working under natural conditions to continue the work they had undertaken in the breeding of Merino sheep. Indeed, it was to these men to whom the farmers must look to supply the requisite large-framed Merino ewes for the breeding of the crossbreds. In undertaking the breeding of crossbreds every breeder should have an objective. It would be unwise to engage in the work without first of all considering what would be practicable to the situation and locality. For combining wool and mutton the Lincoln and Border Leicester mated with large-framed Merino ewes, were given preference. Where fat lambs were the main object of the breeder, he advised the employment of one of the Down breeds (Southdown, Shropshire, or Dorset Horn) mated with Lincoln-Merino ewes; the only breeds recommended, however, for mating with the Merino were the Longwools. If an earlier lamb of the first cross was aimed at, the Border Leicester should be used, but for a sheep to market at, say two years old, the Lincoln would be found the most profitable. With the Down breeds, the lambs should be marketed as suckers and on no account held till shearing.

At the conclusion of the lecture, Mr. Whitmill proposed a hearty vote of thanks to Mr. Mathews for his able lecture, and the valuable advice and instruction that had been given during the visit, which was carried.

The monthly meeting of the branch was held at Mr. Tayler's residence, Adavale, on 1st August.

Interesting papers were read by Messrs. P. W. Lorimer and H. N. Marriott. The following extracts are made from Mr. Lorimer's paper:—

The Farm Horse.

Considering that the horse is of primary importance in the putting in and taking off of crops, besides extra work on the farm, we must admit that too many of us are apt to pay insufficient attention to its treatment. The feeding of it is a matter which has been often referred to in the *Agricultural Gazette*, and many varieties of menu have been tried by the different Government farms, as may be seen in the *Gazette* of October, 1912, in an article which is well worth referring to. I take it that the main object in selecting the food is to get the maximum amount of work at a minimum cost and loss of condition. To my mind, this cannot be achieved without keeping up condition, for there is no doubt that as soon as a horse starts to "fall away" it eats and needs more food to do the same work, than the one that is still fat. The foods suggested in the article mentioned, would, no doubt, be good in a small way: but to the farmer working twelve or more horses they would be

more or less impracticable, and we therefore have to suit the diet to our own circumstances, with the condition of the horse as our first consideration.

I cannot write of many varieties of feed from experience, but have no trouble in keeping my horses in good working condition by using clean chaff and plenty of crushed oats. I find that one and a half bags of crushed oats (1½ bushels) saves easily a bag of chaff at 30 bags to the ton. Valuing oats at 2s. per bushel, and chaff at £2 10s. per ton, this would appear to be a bad financial proposition, inasmuch as it takes 3s. worth of oats to save 2s. worth of chaff; but I consider the 1s. difference is well invested in the extra work that can be obtained, to say nothing of the satisfaction of having fat horses instead of lean. Further, it must follow that a horse which is kept constantly in good condition will mature better and develop a stronger constitution and thus be a better asset to the farm.

The chaff should always, if possible, be clean and attractive, the best time to cut hay being just after the formation of the grain, so that there is a little pinched grain in the chaff, and yet it is a good colour. To my mind, over-ripe and dry looking chaff, must be to a horse as uninteresting as dry bread would be to man. If, through no fault of his own, a farmer must feed on chaff with grass-seed in it, then he should attend to the horses' mouths every day, and see that the seeds are not allowed to lodge and accumulate there.

The horse's teeth are a great factor in its ability to make the best use of its food, and these should be attended to by a qualified man say every two or three years. Aged horses are the most troubled in this way, though three and four year old horses often need attention too, as they may have trouble in losing their back teeth. I had a good instance of the value of this only this year, in an aged horse, who was poor all last cropping season. I put it down to his age more than anything, but I had all my horses' teeth attended to at the end of the winter, and this horse, a year older, went through the whole of this ploughing season in really good condition. Its teeth were attended to previously three years ago, but in that time they had grown rugged and irregular.

Sore shoulders are more often than not caused by carelessness or neglect, though we all know that some horses are thin-skinned and poor blooded, and will have bad shoulders in spite of all care and attention. Much trouble can generally be prevented by attention to the collars, keeping them well cleaned, and seeing they fit well. Back bands are a great help, but must be of the right size and worked in the right place. I think they should be worked midway between the wither and the hips (not far enough back to interfere with the kidneys), and should be adjusted to bring the draft at a right angle to the slope of the shoulder. They then take the weight of the bars behind, and all swinging motion is thrown on the back-band and not the collar, and there is thus a straight steady pull from the shoulder. Sometimes a shoulder will become galled before it is noticed, and then it has to be dressed, but no application will cure a sore without first removing the cause. Try altering the position of the hame-hook, or the back-band, changing the collar or packing it up with a bag, and if a sore spot appears to become chronic and cannot be cured, have the collar chambered.

Rugging horses in the winter is an admirable practice and helps to keep up condition, but unless attended to very regularly is apt to do more harm than good.

In summing up, let us realise the value of a horse, and what it has to do for us, and do our best to keep it in good condition and heart, and save it sore shoulders, for after all it is practically a delicate machine and cannot be expected to keep working without the very best attention.

Mr. Marriott's paper was as follows:—

THE FOAL AND THE WORKING HORSE.

To start right at the beginning of this subject, let us do our best to get the brood mare mated early to a sound and suitable sire, so that our young helper may have the best chance at the spring grasses, which ought to impart good growth and development. I think regular work without sudden strains or knocking about—work that she has been accustomed to—is more of a benefit than otherwise to a mare in foal. When approaching the time of foaling see that she is in decent condition, not too fat or too lean, and put her in a cleared and handy paddock with enough green fodder to eat, or failing green stuff, good dry feed mixed with such opening food as bran, &c. A mare with an early foal can take an easy shift during harvest operations, but see that the foal is secure in a good yard while the team is working, for many serious accidents have come about through foals running to their mother and tangling up the team.

In handling youngsters, it is good to start as early as possible. Make them accustomed to handling, but never tease or fool with them; always let them know they have a master and teach them to lead with a halter. All this can be done while the foal is still with the mother, and without interfering with everyday work, while brushing down and feeding the team, and it saves a lot of time and knocking about when finally it is desired to use it for work. When about nine or ten months old, the foal can be weaned by being taken away to a paddock out of hearing of its mother's call, to allow it to settle down the quicker.

See that the paddock is securely fenced, with no loose wires about and that the pasture is not bounded with a wire fence, which has a gateway leading to another pasture, as this often leads to an entanglement with the wire, resulting in a blemish or even permanent injury to the youngster.

When two years old he should be ready for light work. He is already quiet to handle and willing to be led anywhere. Put him in a waggon team first, as a waggon seems the handiest place to break in a young one. If he does not understand this way of pulling after repeated trials, do not thrash him—for in nine cases out of ten it is want of knowledge only. Try him on a small log first with an old horse, then by himself—very light at first and gradually increasing the load. In fact, in all cases, with team or single harness, it is advisable to start with a load easily handled, before trying the maximum.

Choose the plough team as much as possible for equal strength and pace, so that work will be evenly divided. See that the horses' hoofs are cut into decent shape, and have no long protruding edges, for they cannot then be expected to step cleanly. Let the collars fit well, be clean and in good repair, and the horses allotted to the places best suited to their style on the ploughed ground. The willing horse gets the most work every time. Each horse should have his own place at the feeder and be kept to it. Morning and mid-day feeds could be lighter than the last in the day. Make the mid-day one light in bulk and proportionately heavier with grain. Keep one eye on the horses while they are feeding. If any s'obber, or drop half-chewed balls of chaff, or chew with seeming difficulty or tenderly, there is sure to be some trouble with the teeth and this should be looked to. A long tooth, perhaps, is cutting, jabbing into the opposite jaw, or sharp, irregular and long edges to the back teeth may be the cause. In young horses, before they get their permanent teeth, it often occurs that they have a difficulty in shedding the milk or baby teeth. Sometimes these stay in, partly moved out of place, for months longer than they should, making it very uncomfortable for the horse to eat, and keeping it out of condition. These can often be removed without the aid of a vet.

A plentiful supply of good drinking water should be available before each meal. It is far more essential before than after feeding. All harness should be removed, except winkers, before each feed. How can a horse drink or feed in comfort with a collar slipping up and down on his neck? Remember comfort means good condition, discomfort less condition; besides, even for the sake of the collar it ought to be taken off. Should a shoulder be inclined to get sore, the first symptom generally being a slight puckering of the skin, bathe it well with alum and water, keep it clean and put a folded smooth chaff bag under the collar; see there are no creases and that it is fastened so as not to slip. If the team can have a good grass paddock to run in when not working so much the better; failing this give a proportionate amount of bran and always have a salt lick handy.

DISCUSSION.—The papers created considerable discussion and Mr. Marriott's system of watering before feeding was challenged by Mr. JOHN WALSH, who was strongly of opinion from his own experience that horses were better for being allowed a little feed before watering. Even if they only stood at the feeder, Mr. Walsh considered that much better than giving horses water while they were heated.

MR. MARRIOTT explained that by the time horses were unharnessed and reached water they had cooled down considerably, and his opinion was that feed going into an empty stomach was more likely to become indigestible.

MR. WALSH explained that he always had fodder ready in the feeders at any time, either day or night, and he gave it as his opinion that 1 ton of crushed oats was equal to 3 tons of chaff. His daily ration for twelve horses was about 3 bushels of crushed oats and 3 cwt. of chaff. Last ploughing season, he was without oats for a couple of weeks and found the horses ate 3 cwt. more chaff per day and lost condition.

The question of chaff was fully discussed, and the general opinion was that the right time to cut for hay was just after the flowering of the wheat plant. One member aptly expressed it by saying that he believed in having the chaff in one bag and the grain in an another.

Cowra.

A lecture on "Parturition of Farm Animals," was delivered by Mr. C. O'Gorman, M.R.C.V.S., on 2nd September, under the auspices of the above branch. A number of apprentices from Cowra Experiment Farm attended, in addition to other members.

Fairfield West.

A meeting of the above branch was held on 29th August.

It was suggested by the Secretary that leading items of interest in each *Agricultural Gazette* be discussed at each following meeting, and this will in future be done.

The article on "Grafting on Resistant Cuttings," published in the August issue, was discussed in an interesting manner by Mr. N. Stimson, who mentioned that he had always grafted on to the rooted stock and found it a good method, although grafting on to the cuttings could be done in a much more comfortable way, and no doubt much more quickly.

It was considered that the Montpellier was the most suitable resistant vine to graft on to in this district, although the Rupestris du Lot was recommended by many.

Mr. Stimson was accorded a hearty vote of thanks for his address, and members are hopeful of hearing him deal with vine-growing more fully at some future meeting.

It is proposed that a number of members of the branch should pay a visit of inspection to the Hawkesbury Agricultural College during October.

Garra and Pinecliff.

Mr. C. Pedersen, Dairy Instructor, conducted a demonstration in Babcock testing at Mr. H. Robards' farm, on 29th August, and lectured on dairying at night, at the Public Hall. The testing was interesting to those present owing to the surprises the tests caused. The branch intends to commence testing the cows of the members, and Mr. Blackwood, who is an old student of the Berry and Bathurst Experiment Farms, will act in the capacity of tester.

Henty.

The following paragraphs are taken from a paper read by Mr. C. Tovey, at the meeting of this branch, on 11th July :—

Buildings on the Farm.

I shall endeavour to give a few hints as to the most economical and effective methods of utilising the materials most easily available, and also to explain and illustrate the principles and rules of construction as applied to local requirements. This may assist in building or superintending the erection of buildings, with a knowledge of the sizes and strengths required for the various positions, so that the heavy timber be not put where the light should be, and *vice versâ*. The situation for the stable should, if possible, be on ground sloping to the front of the building to give facilities for drainage. Cold south and west winds should not be allowed to blow into the stable door. The usual method in home-made buildings in this district is either to set pine poles upright in the ground (which if not plugged or filled in with clay makes a very draughty building) or to set up good-sized posts at intervals of 6 or 8 feet, the edges adzed and the spaces filled in with 1½-inch slabs, laid horizontally and held in position with fillets about 2 inches x 1½ inches on either side. The latter method is preferable, and many buildings erected in this manner have stood well for many years. Buildings erected on the first method, viz., upright poles unstrengthened by stays or beams, usually assume a lopsided appearance in two or three years. But whether the buildings are constructed as mentioned, or framed with sawn timber, with brick or stump foundations, and covered with galvanised iron, the principles of construction properly applied will economise material, and assist in preserving and strengthening the structure. The primary principle on which strength and stability is given to all structures framed in wood or iron, is founded on the rigidity of the triangle. The square or polygon can be moved, unless braced with a triangular stay. All framed walls, therefore, should be stiffened with triangles or braces, secured to the studs diagonally to form true triangles. A strut or stay with one end in or on the ground does not answer the purpose satisfactorily. All struts and stays should form true triangles, fastened at each intersection.

In the roof the same principle should be observed. In a wide span it is advisable to have framed principals. The tie beam, as its name implies, is for tying the building together laterally. The heels of the principal rafters should be notched in and secured by bolts or straps to the tie beam; then the meeting at the top of the rafters supporting the ridge is a fixed point from

which the centre of the tie beam can be supported by the king post. The tie beam should be secured to the king post with straps and wedges, or a bolt to take up the sag and give the beam a slight cant. At or near the bottom of the king post, the struts which support the centre of the rafter are notched. It will be seen that the idea of the roof truss is a combination of angles to support the roof with the bearing on the walls, all other points being thus rendered rigid. The amateur builder is apt to presume that the tie beam should carry some part of the superstructure directly from its centre; this, you will perceive, is not the case, the strains or stresses on the various timbers being as follows:—Tie beam, tensile or pulling strain, rafters, cross strain with compressive strain; king post, tensile pulling strain; struts, compressive strain; purlins, cross strain. The sizes of these various timbers depend on the span and weight of roof; but when we consider the various strains on the differing pieces with the proportionate values, we can more easily arrive at an approximate estimate of the sizes required. For instance (taking American fir or Oregon as a standard) timber under compressive (or crushing with the fibre) strain will by experiment resist about ten times the strain applied to a similar-sized piece when under lateral or cross strain. In other words, if a piece of timber 10 feet long, 4 inches by 4 inches in section, supported on two ends will bear a load of 1 ton on its centre, then a piece 1 foot or more long, 4 inches by 4 inches, will bear a load of 10 tons on its end. According to this, you would say, a tie-beam need then be only 1-20th the size of the rafter; but we must take into consideration the length of the tie-beam and compare it with the length of the rafter between supports, also make allowance for any probable defects, and the necessity of having something solid to make the necessary mortices and notches. The struts also (in wood under compressive strain) are usually larger than actually required, according to calculated theory, to give them a greater bearing; and if they are long they may be deflected with the weight, when they would be under another strain, which is called a shearing strain. The usual proportions of the various timbers in a roof truss of 30 feet span would be—tie-beam, 7 x 3; principal rafters, 6 x 3; struts, 3 x 3; king posts, 4 x 3 to 6 x 3, *i.e.*, wider at each end, to give support to rafters and struts; purlins, 4 x 3; common rafters, 5 x 2. The ridge, which I have not previously mentioned, is not necessary to the strength of the roof, as it is inert when in its place and fixed; but it is convenient in constructing the roof as a centre line to secure tops of rafters. It serves no purpose in a properly constructed roof to put in timber to support the ridge other than that support it already has in the rafters.

With regard to the fittings of cow bails and stables, the best feeders are made with 24-gauge plain galvanised iron bent half-round, and the edges turned over and secured to 4 x 3 hardwood rails. Ends can be made with 1½-inch wood, cut to shape and nailed wtih heavy clouts.

The old-fashioned way of making the stable door in two halves, the top being opened for light and ventilation (in many cases being the only light and ventilation provided) is not necessary in this climate. It is better to give light from above with roof skylights if practicable, and if not (as when there is a loft above the stable) openings should be left under the eaves covered with ½-inch mesh wire netting. The door should be strongly framed, the lower portion of ⅞ hardwood, T. and G., and the top open and covered with ½-inch mesh wire netting. This will give light and ventilation, and keep out the sparrows and fowls.

The construction of floors to farm buildings is a subject on which there are many opinions. For stable floors I believe the most usual practice is to set up short pine blocks on end closely together. I have noted a few such floors, but usually they were very uneven, and in some cases almost dangerous. If properly laid, the wood-block makes a very good stable floor, as it is not hard on horses' feet, and should give good wear. I recommend the following method for a stable floor:—Clear away the top soil to about 9 inches below level of proposed floor; well ram, and cover evenly with good sand or small gravel, not forgetting to give the necessary fall for drainage. Then lay diagonally 6 x 1 sawn pine boards, well tarred on both sides; on this surface set the blocks 6 inches long; if round, put the blocks as close together as they will go, and fill in the interstices with tar and sand. Those of you who have an engine and saw bench could employ this method cheaply; but instead of putting in the blocks round, cut them off 9 x 3 sawn pine. In this case they should not be

set close together, as the moisture would swell them and cause trouble. Joints should be about a quarter of an inch wide. If it is desired to provide a loft over the stable, the walls being built high enough for the purpose, plates should be bolted on either side at the desired height to carry ends of floor joints, and a carrying beam should run down the centre, supported on the tops of the stall posts, which should be long enough and strong enough for the purpose. The joists should not be less than 9 x 3 Oregon or hardwood, 18 inches apart for a span of 10 feet. The floor should be T. and G. boards, at least 1 inch thick, well cramped to prevent dust falling through on the horses. In barns and lofts in England, used to store hay or straw or corn in sheaves, the queen-post principal is used, which provides an opening in the centre, through which the hay or straw is thrown to the stacker, when the hay is filled above the eaves. It is often stacked almost to the ridge. In conclusion, let me recapitulate the chief points to be kept in mind when about to erect the farm buildings. Select the site to give good drainage, accessibility, a good aspect, good light, and ventilation; well-selected materials of such dimensions as to ensure strength and durability, coupled with economy; and in using timber near or in the ground do not forget the tar-pot.

Inverell.

At a meeting of this branch, held on 7th August, Mr. F. A. Lewin, presided, and four new members were elected.

Mr. F. Ditzell, Inspector of Agriculture, was present and promised to give a lecture at an early date on "Maize Culture."

An interesting discussion on the use of explosives in clearing took place, one or two members reciting their own experiences, and others advocating and opposing the method.

The following paper read by Mr. Kook was listened to with close attention :-

Construction of a Hay Shed.

The first consideration will be the choice of a site; this should be elevated as much as possible, providing it is in a convenient spot for the handling of the hay, to which it should be as near as possib'e, to save the de!ay in haulage.

The next matter will be the size of the shed, and a very useful size is 49 feet square with a height of 20 feet average to the beams in the midd e span. A shed constructed in the way about to be described will be found very convenient to work in, as in filling the waggons can be driven straight through, and in cutting the hay into chaff the machinery can be worked in the shed, which enab'es cutting to be carried out in wet weather. For a shed of the dimensions referred to, sixteen posts will be neede', eight of which will be 25 ft., and eight 23 ft., four beams 24 ft., twe've p'ates (if possib'e sawn) 6 x 3, and 17 ft. 6 in. in length, eighty rafters (forty 12 ft., and the rest 14 ft. in length), about 1,100 ft. lineal of 3 x 1 battens, ridge 50 ft. x 7 x 1½ linea'. Iron, 104 sheets of 7 ft., and 104 sheets of 6 ft.; eighteen lengths of 5 in. O.G. guttering, nine lengths of 16 in. ridging, and about three dozen brackets; thirty-two bo ts from 6½ in. to 9 in. x ½ in., and a few smaller bolts for corner rafters, a good few pounds of 3 and 4 in. nails, and spring heads to match the iron, each sheet taking five nails.

In constructing, the first thing will be to get a square with sides of 49 feet; the use of the 3 : 4 : 5 method of setting out a right angle will readily do this. Then sink the four corner ho!es about 4 ft. 6 in. in depth, and stretch a line over the centre of these holes each way; then measure the other holes, and sink. The measurements will be 22 ft. for the centre span, and 13 ft. 6 in. each side. The other way the posts will all be about 15 ft. 9 in. (nearly) apart. The next matter will be to get the level of the site, in order to cut the posts. Drive in two pegs at each corner, about 2 feet from each hole, but so that the line will pass over the centre each way; then stretch a line right round the building site and level with a spirit-leve'. The cord shou'd be started low at the highest point; this done, cut all the posts before they are erected, which is a very big item. To do this, get a nice batten about 8 or 9 feet in length, put it in the hole, say No. 1, and where the line intersects, make a p'ain mark; then place it on No. 1 post, at the bottom, and mark the post at the line-mark on the bottom. Then measure say 18 feet from the mark to the top of the post, and saw off. As each post is cut for a certain hole, it must be plainly numbered. The eight posts for the centre are cut first, and after they are sawn off, measure 11 inches from top, and saw half through, then adze this out well and level. Now cut all the beams off 23 feet in length, and square about 15 inches at each end, say 3 in. x 5 in.

Drag posts Nos. 1 and 2 into position parallel along the holes, with the slot up, lay the beam on, and measure just 22 feet outside to outside posts, bore, and bolt beam on. Then by means of a Spanish windlass, the whole set can be pulled up. Place a good slab in each hole to prevent the dirt from going in. To work the windlass you require two steel ropes about ⅝ in.; fasten the short one to each corner of the beam, and the other in the centre of this rope; the short rope acts as a guy rope; the other is then fastened to the windlass. The beam should be raised at least 3 feet before starting to wind the windlass; in a few minutes the two posts and beam will be in their position. The whole four sections can be pulled up in this manner.

The outer eight posts are then cut 2 feet shorter above the line-mark, say 16 feet. Cut the slot only 6 inches in these for the plate. These are put up singly.

To put up the plates, measure the spans separately; each should be about 16 ft. 4 in. from centre to centre. The end plates must all project at least 8 inches; to cut these measure 8 inches and square; then cut from corner to corner of square mark; cut all plates identically, and put one bolt through each joint. All the centre posts will project 6 inches above the beam; cut this in 3 inches, depth of plate, flush with the beam, and place on the plates; as each plate goes on bolt up joint, and bolt again through post. All centre rafters are cut 11 ft. 7 in., and wing rafters 13 ft. 6 in. Cut heels on all rafters; by this system all the plates can be squared into position easily to carry the points of the outside wings or rafters; nail a 3 in. x 1 in. batten along the plate just flush with the bottom. A shed built on this principle has only four posts in the centre and will, if properly filled, hold 150 tons of hay.

Jerrara.

This branch held its monthly meeting on 15th August. A paper on bulk handling of wheat was read by the Secretary, and a healthy discussion of the subject followed, as an outcome of which the Secretary has asked the Department the following questions, the replies to which are appended :—

Points about Bulk-handling of Wheat.

1.—In the systems of the bulk-handling of wheat, is bagging eliminated altogether?

2.—Is wheat shipped in the bulk or in bags?

3.—When may Manitoba and other spring wheats be planted, and what are the names of the spring wheats on the market?

In reply to questions Nos. 1 and 2, it was stated that bagging would not be eliminated altogether, because the bags would still be attached to the harvester; this would be the only bagging that would be required, if from the harvester the wheat were placed in bulk in suitable trucks for transmission to the railway station. But in the case of bulk handling in New South Wales the wheat would most likely be carted in the bags to the railway station, there emptied into either storage reservoirs or trucks for transmission to Sydney or other port of shipment. Thus a farmer would be able to use his bags over and over again, instead of losing his bags when he sends them to market, as is the case at present.

Regarding question No. 3, it was stated in the reply that Manitoba wheat for Australian conditions should be sown in the autumn. The term "spring wheat," can only be applied if wheats are sown in the spring, such as is the case in Europe, but those varieties which are usually termed spring wheats, when sown under Australian conditions, *i.e.*, in the autumn, really become autumn wheats. To sow any kind of wheat in New South Wales in spring time and expect a crop is altogether out of the question. Therefore any so-called "spring wheats," even if they are sown here, must be sown in the autumn. The so-called "spring wheats" with which this Department has experimented from time to time, are Marquis, Red Marvel, Red Admiral, Sensation, Improved Red Fife, Perfection and Dreadnought.

Of those tried, Marquis has undoubtedly given the best results, but none of them can compare in yield with the varieties recommended by the Department, which have been specially bred and selected for Australian conditions.

The annual meeting was held on 4th September, when the following gentlemen were elected office-bearers for the ensuing year :—Chairman, Mr. Allan Collins; Vice-Chairmen, Messrs. F. Brown, and D. R. Collins; Hon. Secretary and Treasurer, Mr. A. O. Lane.

The secretary's report stated the branch had been in existence for one year, and much good work had been done and healthy interest stimulated. The increasing membership spoke well for the usefulness and importance of the branch as an agent in the progress of the district. Seven ordinary meetings had been held. The Assistant Sheep and Wool

Expert had visited the district during the year and had given a lecture and demonstration, which were much appreciated. A library had been established for the use of members, and contained 150 books and pamphlets that dealt with local industries.

Lower Portland.

At the August meeting of this branch, Mr. J. J. Eales, read the following paper:—

Making Orange Wine.

To make a 36-gallon cask of wine, from ten to eleven gin cases of oranges and a bag and a half of sugar are required. First get the oranges cased up alongside of the crusher ready for crushing. Three casks are needed—the bung cask in which the wine is made, and two water casks, that is, casks that an ordinary sized dipper can be lowered into; one is used for the ferment, and the other for the juice. Half fill the ferment cask with water; I prefer pure rain-water, as I think success depends to a great extent on the purity of the water. Then commence crushing with something under the spout of the crusher to catch the juice and skins—a kerosene tin will do. When the tin is full, roughly squeeze the juice out of the skins, put them into the ferment cask, and strain the juice into the juice cask. Keep repeating this till all the fruit is crushed. Add the sugar to the juice and water, and stir till well dissolved. It will be found that the ferment cask will not hold all the skins, but what it will not hold can be thrown away. Leave in the ferment for a day, and then squeeze all the water out, after which the skins can be thrown away. Strain the ferment into the juice cask. Then, having set up the bung cask in a position where the sun will shine on it (against a wall is a good place), strain out of the juice cask into the bung cask, that is, the cask the wine is to be made in. It may not be necessary to strain twice, but I am told that an orange seed is likely to spoil a cask of wine. However, when the straining is finished, place the bung in the bunghole loosely, so that it will lift when the wine commences to work, which in ordinary weather will be in three or four days, but in warmer weather probably in a couple of days. How long it should be left before bunging up is a matter of opinion. I close it up in fourteen or fifteen days, but some allow it to work thirty or forty days. One man I know closes it down in six or seven days. I usually open it in three months' time, but some allow it to mature for twelve months, whilst others open it up in six or seven weeks.

Departmental Note.—The Viticultural Expert points out that Mr. Eales does not state what is the ferment to be used, or where he proposes it should be obtained from. It is not advisable to rely on the natural yeast germs found in the orange peel; it is better to obtain brewer's yeast. To make the extraction of juice easier, and to avoid crushing the peel too much, the oranges might be cut into halves; too much crushing of the peel causes the wine to contract a bitter taste, which, however, some people might like if not too pronounced. The Viticultural Expert recommends mixing 1½ oz. of potassium metabisulphite with every 50 gallons of the juice, divided thus:—Half the quantity before fermentation commences, the other half when fermentation is in full swing.

Milbrulong.

The annual meeting of the above branch was held on 31st August, when the following office-bearers were re-elected: Chairman, Mr. J. H. Rogers; Vice-Chairmen, Messrs. F. Gollasch, J. Gleeson, and E. Hoffmann; Treasurer, Mr. W. F. Gollasch; Hon. Secretary, Mr. O. Ludwig.

The members' subscription fee was again fixed at 2s. 6d. per annum.

The Secretary reported that five ordinary meetings had taken place, and three lectures and demonstrations had been held during the year, besides a visit to Wagga Experiment Farm, in October last. By these means much valuable information had been imparted to members. It was agreed to visit Wagga Farm again this year.

After the formal business a smoke social was held, when occasion was taken by the President (Mr. Rogers), on behalf of the members to present a gold medal, suitably inscribed, to Mr. O. Ludwig, who has been Hon. Secretary of the branch since it was formed, three years ago.

Walli.

A lantern lecture on "Conformation and Unsoundness in Horses," was delivered by Mr. O'Gorman, M.R.C.V.S., on 3rd September

Orchard Notes.

W. J. ALLEN.

October.

Cultivation.

Now that the summer weather is commencing to be felt, cultivation should not be neglected. The soil around the base of all trees and vines should be loosened to a good depth with a pronged hoe. Whilst frequent stirring of the soil is necessary, it has to be borne in mind that at this season of the year thunderstorms frequently occur. In that case provision should be made to take away excessive surplus water. A light plough-furrow run through the row of trees after cultivation will serve the purpose. The land should be worked with spring-tooth cultivators as soon as possible after rain. Frequent working will assist in conserving moisture, and also keep the soil in the best condition to receive any rain that might fall. In conjunction with the cultivation of the soil for moisture-conservation is the application of a mulch for young trees. Well rotted stable manure, straw, grass, &c., are excellent materials for placing around the trunk. The mulch should be placed just clear of the trunk, and be spread, whenever possible, over the area not covered by the cultivating implements.

Codlin Moth and other Pests.

The spraying of all apple, pear, and quince trees should still be carried out in conformity with the Fruit Pests Act. A high-pressure pump is necessary for the best work. The trees should be well coated with spray. If possible, the hottest part of the day should be avoided for carrying on the work. Soft water is preferable for use in diluting the spray mixtures. The second spraying should be given for Black spot of the apple and pear as soon as the fruit is well set. Bordeaux mixture applied at a summer strength: Copper sulphate (bluestone), 6 lb.; lime, 4 lb.; water, 50 gallons, is suitable for the purpose and may be applied in conjunction with arsenate of lead. If lime and sulphur solution is used alone, the Department's formula 53 lb. lime, and 100 lb. sulphur to 50 gallons water, should be used at summer strength, *i.e.*, a dilution of 1 part of the concentrated mixture to 28 parts of water.

Borers.

While working around trees, watch for borers on the trunks and branches, as it is very easy when they are first commencing their work to cut away the bark and find them. In this way the orchard can be kept free of the pest.

Cherry Slug.

This pest will soon be making its appearance. Arsenate of lead will be found suitable for keeping it in check.

Peach Aphis.

Peaches will give trouble this month with the black aphis. Spraying with tobacco wash and soft soap, when thoroughly done, will keep the aphides in check. Two applications may be necessary.

Grape Vines.

Sulphur (flowers) should be placed upon the crowns of the vines, using about a dessertspoonful for each vine; this is an excellent treatment for preventing the spread of oidium. When this fungus is prevalent, dusting may be necessary; bellows for the purpose may be used, and knapsack sprays are also found economical for applying the sulphur. In the event of rain, applications should be frequent. For Black spot a late spray that will not discolour the fruit is necessary. For this purpose the Bordeaux mixture must be superseded by ammonio-carbonate of copper. Formula: 5 oz. copper, 3 pints ammonia, 45 gallons water.

Irrigation.

It is more than likely that the first irrigation of the season will have to be given to all trees and vines some time this month. Therefore, see that furrows are well made, and that they are deep rather than shallow. While irrigating, see that no water is allowed to flow over the surface of the soil, nor lodge around the trunks of trees. When watering, give the land a good soaking, taking care to see that the water reaches the roots of all young trees and vines. Immediately the ground is dry enough to work, it should be worked up to a good depth with suitable implements; the soil in the immediate vicinity of trees and vines should also be well worked up with a fork hoe.

Dormant Buds and Grafts.

Keep all worked stock well disbudded; never allow suckers to grow where either bud or graft is doing well. If the stocks on which buds were inserted have not been cut back, this should be done without further delay. The cut should be slanting, being slightly lower on the side opposite the butt; and it is advisable to stake them, not only to prevent their being blown out, but also to encourage a straight trunk.

Where grafts have been put in old trees, they must be tied to prevent them being blown off. To do this, a good stake should be tied to the branch grafted, and allowed to project a foot or more over the end; then, as the graft grows, it can be tied to it.

Keep a strict watch on all refills and young trees, and if these show any signs of wilting, give them one or two buckets of water from time to time, until they are well established. Disbud all newly-planted trees, leaving at least three or four good shoots, about 4 inches apart, along the trunk of the tree. Do not allow two or three shoots to start from the same place, but give each branch a separate hold of the main stem.

In the case of young trees growing vigorously, and situated in a windy position, the thinning out should not be done too early, as the growth is soft,

and the winds may blow the shoots completely off the stem. Trees under irrigation might have the tips of the young shoots pinched, so as to harden off the branch and permit of thickening and branching.

Pruning Citrus Trees.

Citrus trees may be pruned this month. Remember, this tree is an evergreen, and grows in the shape of a shrub. Thinning out should be carried on carefully, and only dead twigs and wornout shoots require removing. Shortening back, as in the case of deciduous trees, is not necessary. The tree is allowed to practically take its natural form. Old trees that are weak may be cut back hard, to force a new head. All the larger cuts should be painted with white-lead and raw linseed oil mixed into a paste. Thorny mandarins have a habit of bearing far too heavily one season, and very lightly the next. To ensure a more even crop each year, it should be thinned out freely when a heavy crop is showing on the trees.

Budding Citrus Trees.

This work may be done this month if the bark lifts well and the sap is running freely.

Harvesting.

Early varieties of cherries will be fit for market this month. Packing and grading the fruit carefully should not be neglected. In districts where oranges hang late, it will be now time to commence harvesting. The fruit should be graded and packed in diagonal rows in the cases. In this way the fruit carries to the best advantage.

The Necessity for Grading Fruit.

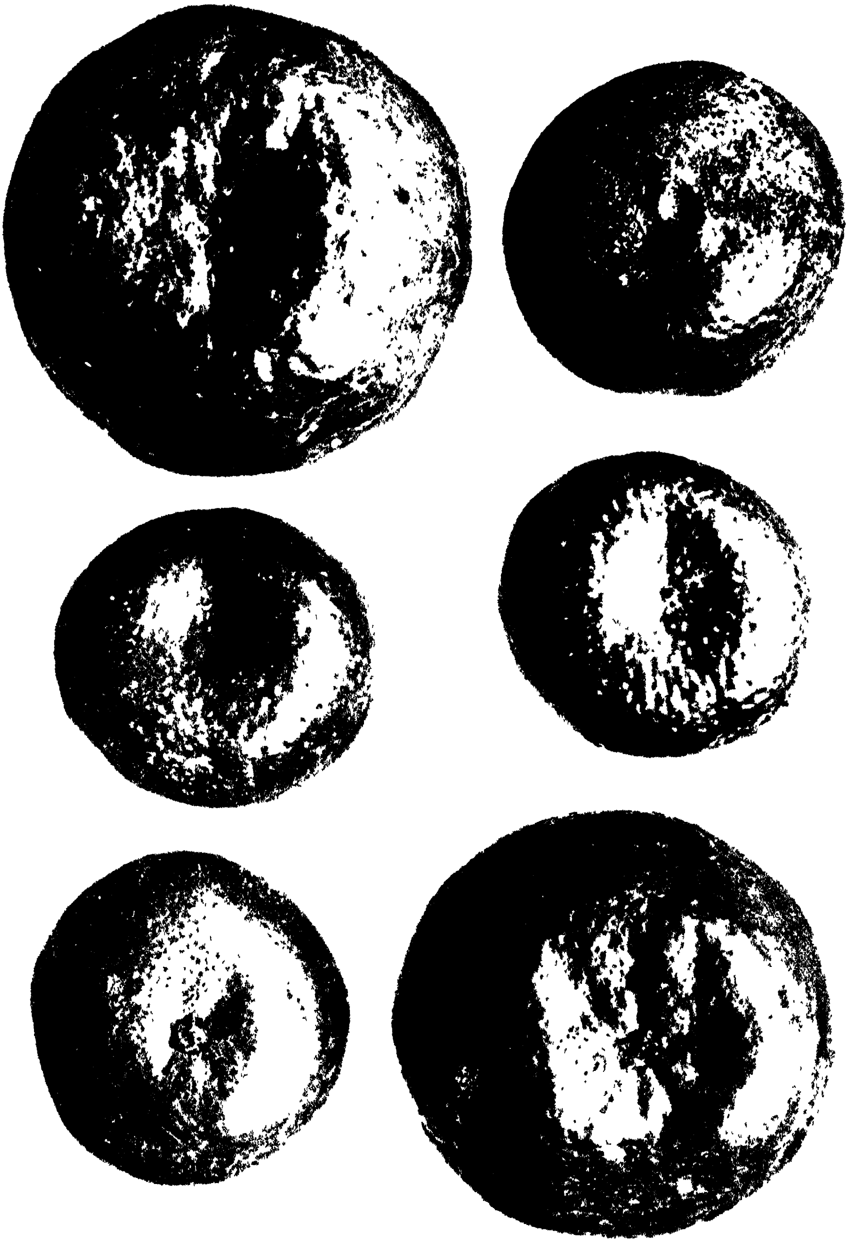
From time to time complaints have been heard that growers do not always receive a reasonable price for their fruit, notwithstanding that market prices as quoted in the newspapers are satisfactory.

In some cases the reason for this is not difficult to ascertain, for some growers exercise so little care in grading fruit that it is really surprising that dealers purchase at all. Quite recently a case of mandarins was opened in the presence of an officer of this Department, and contained Emperor Mandarins of a reasonable size on top, whilst underneath the contents consisted of small fruit of the Thorny and other varieties.

The attached illustration shows the average specimens taken from this case, and it is not at all surprising that purchasers require a big concession in prices before handling fruit of this kind.

Should it be necessary for the grower to pack fruit of both sizes in the same case, a division should be placed in the case and the two classes of fruit packed separately so that purchasers would see exactly what they were buying, and would, therefore, be prepared to pay full market rates for them.

The value of proper grading of fruit cannot be over-estimated by producers.—W. J. Allen.



Ungraded Mandarins,

as occasionally forwarded to the Sydney market.

Department of Agriculture, Sydney, 2nd October, 1914.

To stand the season at Hawkesbury Agricultural College, Richmond, the Pure-bred Imported Clydesdale Stallion,

ROYAL WARDEN (16045) C.S.B.

Royal Warden is a rich bay, showing good quality, combined with substance. He possesses an excellent temper. He was imported in 1912, from Scotland, by the Government of New South Wales. Bred by James Merson, Craigwillie, Huntly, Aberdeenshire. He was awarded first and champion prizes at the Royal Agricultural Show, Norwich, England, 1911.

Sire : Everlasting (11331) C.S.B.
1st Dam : Gem of Craigwillie (21597) C.S.B., by Prince Thomas (10263) C.S.B.
2nd Dam : Lady Edith of Craigwillie (15687) C.S.B., by Prince of Carruchan (8151) C.S.B.
3rd Dam : Jean of Northfield (18564) C.S.B., by Star of the North (2435) C.S.B.
4th Dam : Cowden Jean (19435) C.S.B., by Clydesdale Jock (1415) C.S.B.

Foaled 15th April, 1908.

Fee : Five guineas per mare, or any number over two from the one owner, at £4 4s. each.

By arrangement with the Principal, a limited number of mares may be taken at agistment at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE PRINCIPAL,
Hawkesbury Agricultural College,
Richmond, N.S.W.

To stand the season at Wagga Experiment Farm, the Imported Pure-bred Stallion,

CLANDALE (14628) C.S.B.

Clandale is a beautiful bay horse of substance, and most exceptional quality. He possesses the best of legs and feet. He was bred by Wm. Cochrane, Port Logan, Wigtonshire. He was awarded first prize at Aberdeen Show, Scotland, 1912.

Sire : Allandale (12418) C.S.B.
1st Dam : May Logan (21199) C.S.B., by Prince Robert (7135) C.S.B.
2nd Dam : Handee (21198) C.S.B., by Prince of Wales (673) C.S.B.
3rd Dam : Jess of Portlogan (3145) C.S.B., by Lofty (460) C.S.B., by Hercules (378) C.S.B.
4th Dam : Kate.

Foaled May 10th, 1907.

Fee : Five guineas per mare, or any number over two from the same owner, at £4 4s. each.

By arrangement with the Manager a limited number of mares may be taken at agistment at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE MANAGER,
Experiment Farm, Bomen, Wagga Wagga.

To stand the season at Cowra, the Pure-bred Clydesdale Stallion,

ROBIN ADAIR (16013) C.S.B.

Robin Adair is a big upstanding horse of great substance. He shows good character and good temper. He was bred by Thos. Lean, Wester Deans, Leadburn, and was selected by the Clydesdale Association to represent the breed at the Olympia International Horse Show. He was imported in 1912 by the Government of New South Wales.

Sire : Royal Walter (13717) C.S.B.
1st Dam : Rossie (19808) C.S.B., by Alexander Everard (14242) C.S.B.
2nd Dam : Bell of Western Deans (14652) C.S.B., by Prince of Brunstone (9977) C.S.B.
3rd Dam : Darling of Wester Deans (14651) C.S.B., by Top Knot (6360) C.S.B.
4th Dam : Blossom of Wester Deans (14649) C.S.B., by Stonelaw Lord Lyon (2400) C.S.B.
5th Dam : Bell of Westside (23030) C.S.B., by Pride of Kyle (3904) C.S.B.

Foaled May 30th, 1909.

Fee : Five guineas per mare, or any number over two from the one owner, at £4 4s. each.

By arrangement with the Manager, a limited number of mares may be taken at agistment, at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE MANAGER, Experiment Farm, Cowra.

Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn ...	Melba's Emblem (183 M.S.H.B.)	Emblem of Darbalara (100 M.S.H.B.)	Melba 3rd of Darbalara (1058 M.S.H.B.)	Berry Farm	‖
" ...	Imperialist ...	Florio	Lady Nancy of Minembah	Berry Farm .	*
" ...	The Irishman (imp.)	Tipperary Bull	Colleen Bawn (imp.)	Robertson	17 Mar., '15.
Jersey ...	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Yanco Farm ..	*
" ..	Trafalgar ...	Best Man ..	Rum Omelette	Cowra Farm ...	*
" ...	Kaid of Khartoum	Sir Jack ...	Egyptian Belle	H. A. College .	*
" ...	Leda's Retford Pride.	Dinah's Lad . .	Leda's Angel.	Wagga Farm ...	†
Guernsey	The King's Mirror	Calm Prince .	Vivid (imp.)..	South Kyogle	15 Feb., '15.
" ...	Star Prince ..	Calm Prince ...	Vivid (imp.)...	Casino ...	21 Oct., '14.
" ...	Sky Pilot ...	Prince Souvia . .	Parson's Red Rose (imp.).	Maclean	11 Jan., '15.
" ...	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (5509)	Inverell	5 Oct , '14.
" ...	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	†
" ...	Claudius (imp.)	Golden Star II..	Claudia's Pride (imp.).	Murwillumbah .	1 Jan., '15.
" ...	George III .	King of the Roses	Calm 2nd ..	Wollongbar Farm	†
" ...	The Peacemaker	Calm Prince	Rose Petersen	Wollongbar Farm	*
" ...	King of the Roses	Hayes' King ..	Rosey 8th (imp.).	Pambula .	31 Dec , '14.
" ...	Lauderlad .	Laura's Boy ...	Souvenir of Wollongbar.	Mullumbimby ..	6 April, '15.
" ...	Belfast	King of the Roses	Flaxy 2nd ...	Tyalgum	28 Nov., '14.
" ...	Royal Preel ...	Itchen Royal ..	Hayes' Lily du Preel (imp.).	Tyalgum .	30 Jan., '15.
" ...	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Frederickton ..	Mar. '15.
" ...	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	Paterson-Vacy	11 Mar., '15.
Ayrshire ...	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose...	Grafton Farm ...	*
" ...	Wyllieland Bright Lad (imp.)	Wyllieland Gleniffer (7229)	Wyllieland Sangie	Glen Innes Farm..	*
" ...	Isabel's Majestic	Majestic of Oakbank.	Isabel of Glenoira.	Grafton Farm . .	‖
Kerry... ...	Rising Sun ...	Bratha's Boy ...	Dawn ..	Bathurst Farm ...	*

*Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed.
‖ Available for special service where stationed upon application to the Under Secretary.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1914.

Society.	Secretary.	Date.
Culcairn P., A , H., and I. Society	J. P. Orr ...	... Oct. 13
Hillston P. and A. Society	S. J. Gordon ...	,, 14
Tweed River Agricultural Society (Murwillumbah)...	A. E. Budd ...	Nov. 11, 12
Mullumbimby A. Society	W. A. Davis ..	,, 18, 19
Lismore A. and I. Society	T. M. Hewitt ...	,, 25, 26, 27

1915.

Gosford and Brisbane Water A. and H. Association	H. J. Gates ...	Jan. 15, 16
Albion Park A., H., and I. Association	M. A. Brown ...	,, 20, 21
Kiama A. Association	G. A. Somerville ..	,, 26, 27
Wollongong A., H., and I. Association	W. J. Cochrane ...	,, 28, 29, 30
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Agricultural Gazette of New South Wales.

Plant Improvement for Farmers.

J. T. PRIDHAM, Plant Breeder.

ALTHOUGH farm animals have been carefully bred for centuries, it is only in recent years that definite steps have been taken in the improvement of farm crops. Plant-breeding had been resorted to by gardeners and horticulturists for the production of novelties in flowers and better varieties of fruits, but the farmers' needs were largely overlooked.

Wheat.

That wheat could be kept up to a high standard of yield and purity was known to the Romans, for Virgil speaks of the advantage of gathering fine ears to prevent deterioration. Le Couteur, of Jersey, in 1830; Shireff, of Scotland, about 1857; and Major Hallett, at the same time, took up the selection of cereals with considerable success.

Le Couteur was induced to carry out his experiments by a friend, who showed him that the wheat plants in his field were not pure and uniform as he thought, but of various types. Both Le Couteur and Shireff made a practice of searching their crops for plants of striking appearance and high yield. The seeds of such individuals were sown in separate plots of well-prepared soil, and the seed from the most productive mother plant was multiplied by their sowing and good cultivation, so that after two years enough seed was harvested to place the new variety on the market. Le Couteur originated the Talavera de Bellevue variety of wheat; and several prolific sorts of wheat and oats were thus isolated by Shireff. The choice once made in the field, all that remained to do was to rapidly propagate the stock of seed.

Major Hallett proceeded on a slightly different principle. He had been used to breeding cattle, and assumed that in any crop of wheat there was one best plant, and on this plant the best ear, and the best seed would be found in this ear. The sowing of the best grain in this way he called "pedigree culture," and specially good treatment as to space, soil, manure, and cultivation was given to his plots. Remarkable results were gained in productiveness, but only up to a certain point. By this method the number of stalks per plant and seeds per ear was increased, but the increase was small in some of his initial selections, while in others it was considerable, showing that everything depended upon the first choice. He stipulated, when selling his seed, that the same method of selecting the best each year should be kept up, as in the breeding of animals. No amount of pedigree culture will produce the best results if the original plant chosen is inferior.

In 1886, in the Swedish village of Svalöf, a company was formed for the improvement of cereals, and in the same year Mr. W. Farrer began his work of wheat-breeding near Queanbeyan, in this State. The Swedish company

was founded by private enterprise, with the object of placing better varieties of seed in the hands of farmers. Their first activities were in the introduction of new kinds from foreign countries. The company became enlarged, and was subsidised by the Government. The varieties found were tested in various districts, to determine their suitability or otherwise for the different soils and climates of Sweden. At first the German method was followed of saving heads of similar appearance from a field, and sowing them as a mixture. The progeny, however, were not uniform, in spite of the apparent similarity of the parent ears. Finding that certain plots were uniform, and that these were of the types which were so scarce that seed from a single ear only was sown, the director concluded that seed could only be depended upon to breed pure and true to type when sown from single ears. Subsequent experiments proved the truth of this, the small differences seen being due merely to greater local moisture, space, or food supply. Such differences are fluctuating in character, and it was found that there is no need for continuous selection from year to year to maintain the type constant, as they breed true continuously. Comparatively few of the immense numbers tested were valuable enough to be propagated for sale to farmers. In certain districts certain qualities were esteemed, such as strength of straw, early maturity, non-shattering of grain, frost resistance, and good stooling qualities; and among the new sorts isolated were found superior varieties, meeting every need of the farmer.

Farrer worked also on the principle of the importance of the individual plant. He found that in this way he secured uniform progeny, and that it was not necessary to confine oneself to a single ear from the plant. For over fifty years Messrs. Vilmorin, of Paris, have been engaged in the work of plant improvement, and they discovered that the whole plant gave progeny as uniform as that produced from one of its ears. Farrer never mixed the seed of two plants in the early stages of propagation, even if they appeared to be identical.

Mr. Hugh Pye, of Dookie Agricultural College, Victoria, also makes his selections on the same principle; his varieties, like Farrer's, have been produced by cross-breeding, followed by selection from the varying progeny.

The advantage of artificial crossing is that much greater variation is induced than is found in an ordinary field crop. The labour and difficulty of securing a superior fixed type by this method, however, is far greater than that attending individual plant selection from ordinary field crops; and in this paper it is not proposed to deal with hybridisation.

Professor Perkins, formerly Principal of Roseworthy College, and now Director of Agriculture, South Australia, has introduced some useful varieties by selection, notably Bearded Gluyas, King's White, and King's Red.

Mr. R. Marshall's variety, Marshall's No. 3, originated in the same State, and is one of our best mid-season wheats. Mr. Berthoud, of the West Australian Government, originated the hay-wheat Zealand Blue; and Queensland owes to Mr. Quodling, of that State, the variety Bunge, or Bunge No. 1, which originated on one of the State Farms.

It may be of interest to mention the most prominent instances that have come under our notice of varieties that have arisen from a single plant which attracted the attention of a farmer who gathered the seed, and then propagated and named it as a new variety. We have found that natural crossing occurs from time to time in our warm climate, although wheat is normally self-fertilised, and in England natural cross-breds are extremely rare. The effect is seen in superior height and vigour of the plant usually, so that it is not surprising if such individuals are occasionally picked out by a keen and observant farmer. The "Purple Straw" race of wheat has been in cultivation in this State longer perhaps than any other. It includes many varieties, and affords a wide field for selection; a rich profusion of types will be found in a crop of this kind which has been grown year after year without selection.

Avoca is a hay-wheat selected by Mr. Lalor, of Avoca, Victoria.

Dart's Imperial is a strain of Purple Straw isolated by Mr. Thos Dart in South Australia.

Droophead, originated from the same State, is a variety with a brown ear which curves downward. It was thought to be a variation of Federation, but is probably a selection from Budd's Early.

Gluyas' Early, a drought-resistant variety, was selected by Messrs. Gluyas, of Telowie, South Australia.

Huguenot, a solid-straw hay-wheat of the Macaroni or Durum class, was hand picked from a crop of Medeah by Mr. J. Correll, of the Arthur River, West Australia. It is favoured for green fodder in our coastal districts

King's Early and Viking were originally field selections by Mr. Jos King, of Georgetown, South Australia.

Steinwedel originated in the same State from a single plant noticed by a farmer of that name in a crop at Dalkey. It was a very dry year, and the plant caught his eye because of its vigorous growth.

Turvey was selected from a crop of Purple Straw by a Mr. Turvey, of Rochester, Victoria.

We are growing, for the first time this year, small plots of some new varieties originated by Mr. Farrell, of Walmer, near Parkes. They appear to be natural cross breds, and one named Harriet is claimed to be a better yielder than Federation. Mr. Farrell's method is to mix the seed of two known varieties before sowing and to preserve desirable variations which subsequently appear. The eight varieties under observation here resemble the one or the other of their parents, but are not identical with either.

Enough has been said to show that there are possibilities in field selection without resorting to artificial crossing for the production of superior varieties.

Improvement of Existing Varieties.

A wheat which has served us well may be made to yield even better by a little attention to breeding. In 1908 the writer selected a few productive plants from a field crop of Federation wheat at the Longerenong College,

Victoria. The crop had been sown with seed bought from a farmer, and had not been subjected to methods of selection. The individual plants were sown separately, and each year a few of the most productive plants were saved and propagated again as before. In 1912 a bulk of this selected stock was sown in a field trial to compare with ordinary farmers' seed of Federation, and yielded 43 bushels per acre, while the latter gave a return of only 34 bushels per acre at the Longerenong College. In the Farmers' Experiment Plots carried out in this State by the Department of Agriculture on private farms, the fact that the farmers' variety (the kind favoured by the farmer for his own use) has usually given a lower return per acre than most of the Departmental wheats, must be attributed chiefly to the want of attention to breeding. A case is quoted by Mr. McDonald, Manager of the Coonamble Experiment Farm, where farmers' seed of Marshall's No. 3 yielded only 61 per cent., and of Comeback, 88 per cent., as compared with 100 per cent. secured from selected seed of these varieties.

Selection.

The saving of seed does not receive anything like the care that it deserves Grading a sample of seed is a very good practice, but it does not go far enough. A wheat plant bearing three stalks may produce one fine ear with large grain and two smaller ones, but a plant with five stalks bearing one fine ear and four smaller ones is the more productive, unless, as sometimes happens, its yield is merely due to more favourable surroundings. The large grain from each plant would find its way into the graded sample, but in the one case it would tend to grow three-stalk plants and in the other five-stalk plants. Grading is not selection. What we aim to do by selection is to eliminate the low yielding plants from a variety, and if we start with a few productive individuals it is surprising how soon a stock of seed can be accumulated with good cultivation. Just as the sheep breeder is careful to secure well-bred rams for his flock, so the progressive farmer, especially in the United States and Canada, has come to see that his wheat crop includes some desirable plants which it pays to ear mark and collect for breeding purposes. It is true this work is largely left to the Government Farms to attend to, but it will be found a safe and profitable undertaking for farmers to hand-select good yielding plants of a variety which has proved suitable for their particular district. The increased yields thus effected, though undoubted, do not go beyond a certain point, which is determined by the climatic conditions and the supply of soil moisture. The process of selection requires to be kept up from year to year.

Method of Procedure.

There are two suitable periods at which plants may be selected :—

(1) When the crop is coming into ear.

(2) When it is beginning to ripen.

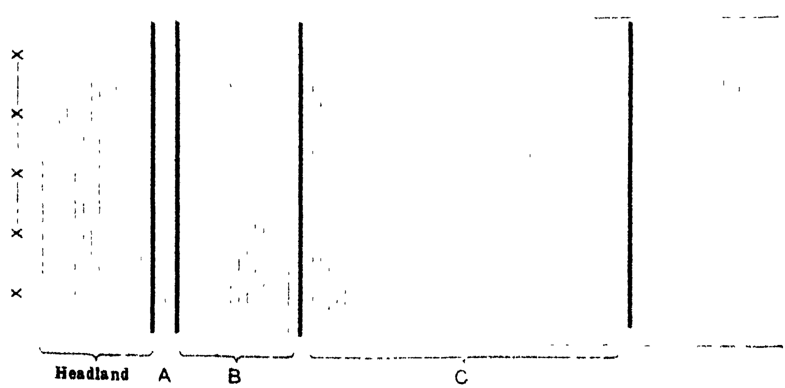
It is a good plan to go to a part of the paddock where the crop is not so hick as the average, so that conspicuous plants may be the more readily

seen, and to tie a thin strip of coloured cloth as a mark, just below the ear, of a productive plant. The early heading or early ripening plants generally yield best. The number of plants so marked will depend upon the enthusiasm of the grower and the time at his disposal. Before stripping the crop the marked plants should be pulled up by the roots, taking care not to include a neighbouring plant as each is harvested. The bundle might be put away in a wheat bag to keep grain moth away, and hung up in the barn until there is time to thresh the plants. If the farmer can spare the time, it is best to thresh, say, a dozen of the largest plants separately, and sow them in as many rows, in the same way as peas are sown, and bulk the remainder. The latter might be sown with the ordinary wheat drill, causing the grain to deliver down one seed spout, the next spout on either side being plugged with paper. When the crop comes up the growth from the selected seed will easily be distinguished, and can be reaped and threshed separately. Thus in the second year there could be a dozen rows and a single drill in the field resulting from the original selections. Plants should be marked in these rows, to form the basis of the selected seed plot for next sowing time.

In the third year we should have the selected seed bulk saved from the previous year and some fresh individual selections, the area sown being increased until enough pedigreed seed has been raised to sow the whole farm.

If the farmer has no small area near the house where special attention could be given to single rows of wheat, the whole work might be done with the seed drill, and selections made each year as described. When once started there is not much trouble in keeping the system going, and the three lots of seed could be sown in the same paddock, allowing one drill spout to run empty to act as a division between the headland and "A," or first year's selection; between "A" and "B," which is the produce of last year's "A" seed; between "B" and "C," which is the produce of last year's "B" seed; and between "C" and the ordinary farm crop, which in the following year will be sown with the grain harvested from "C." There will thus be the three lots of selected seed, A, B, C, sown each year continuously.

DIAGRAM



Change of Seed.

This is occasionally beneficial, but in most cases it does not give nearly such good results as home-grown seed. This has been our experience with wheat; but in the case of oats, seed which has been grown in a cool climate generally yields a heavier crop of hay in a warm district than the locally-grown seed. Apart from the occasional advantage of change of seed, due to climatic conditions with certain crops, there is nothing to commend the practice when farmers give some attention to the selection of seed.

Oats.

The same principles apply as in the case of wheat. A promising variety we are now growing was found as a variation in a crop of Argentine oats, which resembles Algerian, in New Zealand. It has come to us from that State under the name of "Ruakura Rust-resistant." Mr. Kelsall, of Warracknabeal, in Victoria, selected an oat which we have named after him; it is a heavy seed-bearer, but has quite short straw. Both this variety and Ruakura Rust-resistant resemble the Algerian variety. A fine selection from potato oats grown in the Glen Innes district is known as "Hutchinson's Potato," but the Algerian type generally is the most suitable for our climatic conditions. This variety has responded well to selection; the strain of seed we grow at the Cowra Experiment Farm yields decidedly better than ordinary unselected seed. The very early ripening variety "Sunrise," is a selection from Algerian, probably the result of a natural cross.

Barley.

Although there is not a very large demand for this cereal in Australia, it is a useful rotation crop for the wheat and sheep farmer, and attention to its breeding will well repay the trouble involved.

We have at several of the Departmental Farms strains of six-row barley similar to the Cape variety, which are superior to it in yield and quality of grain. These barleys are well adapted to the warmer districts, and are used in America and the neighbouring State of Victoria for brewing purposes.

Maize.

Perhaps more selection has been done with this crop than any other in New South Wales; but even so, we are still in our infancy in regard to maize improvement. Efforts in this direction have hitherto been confined to barn selection, instead of ear-marking desirable plants in the field before harvest. Selecting cobs in the barn may be compared to the grading of wheat. It is true there is a certain amount of good done in the preservation of only large plump seed for sowing, but fine grain often grows on an indifferent plant which happens to have had specially favourable conditions in the field. Mr. Wenholz has already dealt with the selection of this crop, which he has taken up as a special study.

Potatoes.

There is probably no more promising crop for improvement than potatoes, which tend to "run out" or deteriorate more rapidly than crops propagated by seed. The "seed potato" is a vegetative shoot or portion of the underground stem supplied with buds. Bud variation has been noted by Darwin in many different species of plants, and the individuality of the different parts of the potato plant is now generally recognised. The tubers produced by one plant are all distinct parts of the individual, so that variations in yield and other qualities are to be expected. Professor Watt remarked that the variety which topped the yields at the Grafton Experiment Farm last year was the potato which does best on his father's farm in Scotland. The extreme difference in climatic conditions is evident, and there is certainly need for varieties more adapted to our local conditions. The basis for improvement in this crop, too, is the individual plant; and a scheme may be drafted for potato growers similar in principle to that advocated for wheat growers. There appears to be no attention paid to the saving of potatoes for seed, provided that they are not diseased. The best seed procurable of the variety proved to be most suitable for the district should be used. Before the crop is dug, it is advisable to go through the rows and put in a stake against any plant that looks vigorous, productive, and free from disease. When digging keep the potatoes from these marked plants separate from the general crop, throwing out the produce of any plant that does not prove to be a good yielder. In the second year the tubers thus selected should be sown alongside the general crop, giving it the same attention as the rest of the field, but digging it separately. The best plants should be marked in the selected patch before digging, to provide stud seed for the next year, and the remainder may be used for the main crop of the farm. In subsequent years the selection from the seed patch should go on as before, the balance being used for field sowings. An experienced grower will detect the most productive plants in a crop, and the more careful the selection the better will be the resulting crops. As in the case of maize some strains of the same variety differ more in yield than two distinct sorts, so with potatoes. Certain strains of the same variety often vary as much in cropping power as two different varieties. It is always well to try in small plots new potatoes that come into the market, but a trial of this kind should be carried on for several seasons before deciding to replace the main crop variety with a new sort. It will very rarely pay to substitute fresh seed for home-grown selected seed, unless the former comes from a locality of similar climate, and has been also subjected to selection.

A change of seed is always attended with the risks of disease infection, and the selection in the field of hardy prolific plants is a simple and practical way of keeping the farm free from blight and other diseases, including the moth which causes such losses to growers. As the selected plants are dug they may be bagged at once, sewn up, and taken to the barn. Most of the eggs of the moth are laid in the paddock during the digging season, and before the bags are sewn up and carted away.

Mr. A. J. Pinn, Inspector of Agriculture, has found it preferable in the North Coast districts to procure new seed from a cool climate every twelve months, as potatoes are more or less "forced" when two crops are grown each year, and thus the vitality of the crop for seed purposes becomes somewhat impaired.

Sugar Cane.

This has been greatly improved by the Colonial Sugar Refining Company and the Queensland Acclimatisation Society. Messrs. Gibson, of Bingera have obtained from an improved variety a greater yield of sugar per acre than the average yield of cane per acre in Queensland.

Conclusion.

Plant-breeding is not a fad but a commercial proposition, and it seems likely that the "Boys' Club" movement will assist in bringing the importance of the subject more before the practical farmer. As soon as it is recognised that the same principle obtains in plant as in animal breeding, so soon will an interest be aroused. Luther Burbank estimates that "the adding of one single grain to an ear of wheat would give 22,000,000 bushels of wheat per annum to the United States of America, and if the improved variety were common to the world the increase would be 100,000,000 bushels." Plant-breeding, to be successful, must be continuous; if the practice is tried for two or three years and then dropped because a phenomenal increase in yield was not apparent, the fault lies with the grower. Breeding continued on right lines from year to year cannot fail to give returns which far more than compensate for the trouble involved.

The Germination of Paspalum Seed.

A correspondent at Eden, Twofold Bay, recently informed the Department that he had purchased 80 lb. of paspalum seed some time before, and after sowing 70 lb. discovered that it did not germinate. He had also tested the germination with warm water, but with no success. He, therefore, forwarded a sample of the seed for examination.

The sample was submitted to the Agrostologist, who reported that the seed was of no value. Paspalum seed usually contains from 40 to 70 per cent. of formed seed in the samples as purchased, and good seed usually runs about 22,000 to the ounce.

The sample submitted had from 3 to 4 per cent. of formed seed, and ran about 38,000 seeds to the ounce.

As even in good samples not more than 50 per cent. of the formed seed is likely to germinate, it followed that a 1 per cent. germination was all that could be expected of the samples under examination, even under the most favourable conditions.

Explosives in Agriculture.

[Continued from page 860.]

H. C. COGGINS.*

TREE-PLANTING.

INFORMATION is being continually asked for as to the best method of planting trees with explosives: which is the best and most opportune time: what are the advantages gained; and what is the cost of planting trees with explosives as against the present hand method. These are all pertinent questions, and asked by practical orchardists; and it is hardly likely that such men will adopt any new methods before going well into the advantages said to be derived, and also the cost.

To anyone who has travelled our State and has studied the possibilities of production, especially in fruit-growing, one is really astonished at the very few districts where fruit cannot be grown successfully. The writer has frequently asked the question when visiting certain centres, why the residents did not go in for fruit-growing; and the answer is that it did not pay: it had been tried, but the trees did not do well. Often the only method employed is to dig a hole and put in a tree, which is then expected to grow and yield profitably. If the young trees fail, the reason often given is that either the situation is bad or the trees not suitable for the district. Often the sole reason for the failure is that the ground has not been brought into proper condition by thorough cultivation and the conservation of moisture before planting, and after planting to continue the good work of looking after them well. This advice has been repeatedly tendered by our experts: and it is only desired to emphasise the fact that, unless proper care is given the young trees, no matter what method is adopted in planting, nothing but failure can result.

The Use of Explosives in Planting.

Tree-planting with explosives must not be confused with subsoiling. Although with tree-planting the subsoil is loosened to a certain extent, the charge is only half, and the depth of the charge is also about half, besides which the distance between the charges is greater in tree-planting. With the latter it is not necessary to make a big hole, so that half a plug of gelignite is all that is required, and the depth of the charge should never exceed 15 inches. All that is necessary is to make the spot in which the young tree is to rest friable and loose both around and underneath the young fibrous roots. In this respect one of the greatest advantages is made possible, viz., the tree should "sit" on fine loose soil, not on a hard and compact bottom.

* Late Assistant Inspector, Department of Agriculture.

When to Work.

Many people are averse to tree-planting with explosives for the reason that, in their opinion, "pot-holes" are created everywhere a shot is fired, and that these holes get full of water and the trees "damp off." More than one instance has been brought to my notice where such has actually been the case. But where such a thing does occur, it is through ignorance as to the best time for using explosives in the ground. The use of explosives is not advocated at tree-planting time, as the ground at that period is usually moist after the winter rains If not on the surface, the subsoil will be found to be damp; and when explosives are used while the ground is in that state and the trees are planted, failure will result, as the physical condition of the soil is injured, "pot-holes" are created, bad drainage sets in, and consequent sourness of the soil. Explosives should only be used at a time when the subsoil is in a hard,

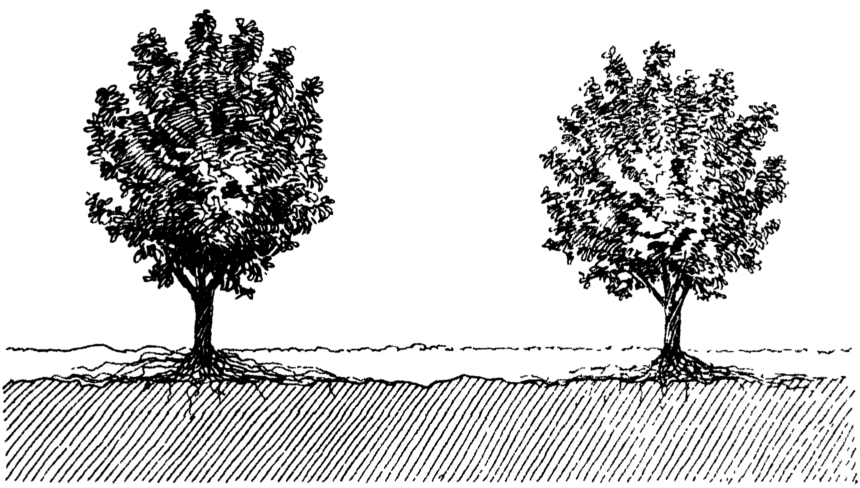


Diagram showing trees planted in shallow soil, with impervious subsoil.

dry state—the harder and drier the subsoil the better the effect of the explosive If it is the intention to plant out, say, in June, July, or August, then take advantage of the first dry spell in the previous spring.

The land should be ploughed, and stakes then placed where the trees are to be planted. These places should be treated with the explosives, though it may be six months or more before it is necessary to plant out. It is a great advantage, apart from the explosives, to plough early and let the ground sweeten up; besides which the ground is cleared of all weeds.

After the shots have been fired the stakes should be replaced, and moisture should be conserved by constant cultivation after any rains, so that when the young trees are planted the ground is in the best possible order.

One of the greatest advantages of tree-planting with explosives is that the earth is loosened up for some distance around the "hole," and consequently the young roots have a better chance of growing. This is especially the case where the top soil is shallow and a clay subsoil exists.

The Method Employed.

To proceed with the actual work. In planting out, say, 100 trees, 100 charges are required, each charge to consist of half a plug; this means one box containing 5 lb. gelignite and 100 No. 6 caps. If the charges are to be 12 inches deep, for the 100 holes 1,200 feet of fuse, or 4 coils, will be necessary. All this material should be handy. Get an ordinary punch bar of octagon steel and tie a piece of string tightly round, a foot from the bottom; this will save measuring each hole. Then with a wooden maul punch all the holes down alongside the stake where the tree is to go. For the charges, take the fuse and cut it into 14-inch lengths (see Fig. 5), the extra 2 inches being allowed for firing when the hole is tamped. Then take the detonator and

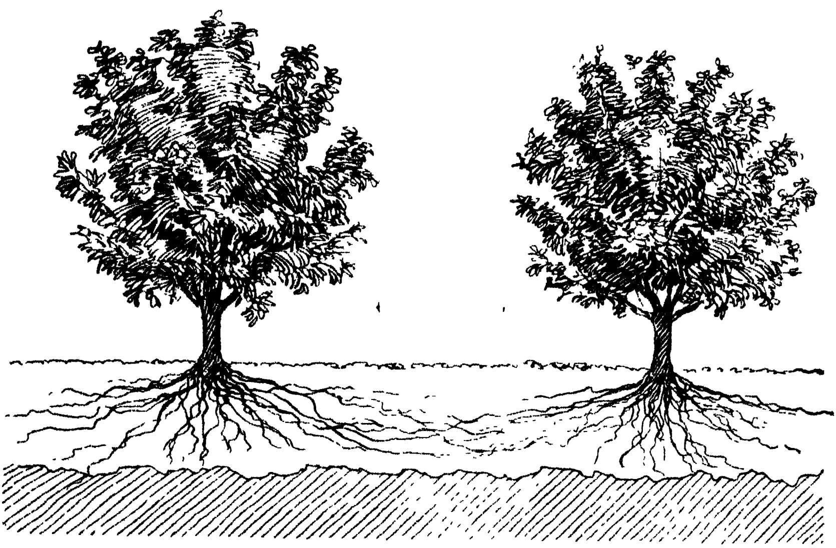


Diagram showing fruit trees planted in ground where subsoil has been broken up by explosives.

insert the fuse into the detonator (see Fig. 6), care being taken not to "screw" the cap on to the fuse, as a third of this cap contains a very high explosive—fulminate of mercury—and any undue rough handling may cause an accident. If it is found that the fuse is too big to go into the cap, unravel a bit of the tape. There is no necessity to press the end of the fuse right up against the cylinder containing the explosive—allow a small space, say about $\frac{1}{16}$th of an inch. See that the end of the fuse that is inserted into the cap is cut square across, not on a slant. If working single handed, make up only about twenty-five charges at a time; if assistance is available, make up the full number of charges required. When the fuse is inserted into the cap, crimp the cap on with the crimpers (see Fig. 7). When this is done, put all the lengths of fuse with detonators attached in a small box. Next take half a plug of gelignite, hold it in the left hand (after having punched a hole in it, as shown in Fig. 8), and insert the cap in

the gelignite (as illustrated in Fig. 9), taking care to keep the forefinger and thumb on the cap whilst so doing. This is to guard against a possible accident by the fuse slipping into the cylinder of fulminate of mercury. While some advocate that the wrapper of the gelignite should be tied round the fuse to keep it on, I find that this is not necessary and a great deal of time is saved. When lowering the charge into the hole it should not be pulled up and down to make certain that it is on the bottom. This can always be seen by the amount of fuse out of the hole. When all the charges are complete, walk along and insert one into each previously punched hole; then return to the first hole and with a wooden tamping rod (a broom handle is excellent) tamp the hole. Throw in a little fine earth at first; if it is a bit damp all the better. Tamp gently at first, and as the top of the hole is approached tamp firmly. This operation is most important, as a loosely tamped hole is valueless, for explosion makes for the least line of resistance, and consequently if the hole be insecurely tamped the charge, instead of being confined below, will shoot up through the hole.

In the event of a misfire, under no circumstances dig the charge out, as such a course is highly dangerous. Punch another hole down about 3 inches away, to the same depth, the firing of the second charge will explode the misfire; but very rarely do misfires occur.

After the shots have been fired go along and with a bar, break the small cavity caused by the explosion—one or two stabs will do this—then replace the stakes, aligning them carefully and the operation is complete. All that is necessary when tree-planting time comes is to throw out a spade or two of earth, and after pruning the roots of the young tree, spread the roots out well in the hole and cover up.

The Cost.

The following is, approximately, the cost of tree-planting with explosives for each 100 trees:-

	£	s.	d.
Gelignite, 5 lb., at 1s. 3d. ...	0	6	3
Detonators, 100, at 4s.	0	4	0
Fuse, 5 coils, at 9d. per coil	0	3	9
Labour, 8 hours, at 1s. per hour ...	0	8	0
	£1	2	0

It will be seen that the cost works out at about 2¼d. per hole, a very modest amount, when the many advantages are taken into consideration, especially when it is realised that the young trees are given a chance the first year, which it is practically impossible to give them under the present system of making the holes by hand.

Splitting Boulders.

Frequently there are floating boulders in our cultivation paddocks which are too large to lift and put on a cart. These are ploughed round year after year.

Fig. 5. Cutting the required length of fuse.

Fig. 6. Inserting the fuse in the detonator.

Fig. 7. -Crimping the cap on the fuse.

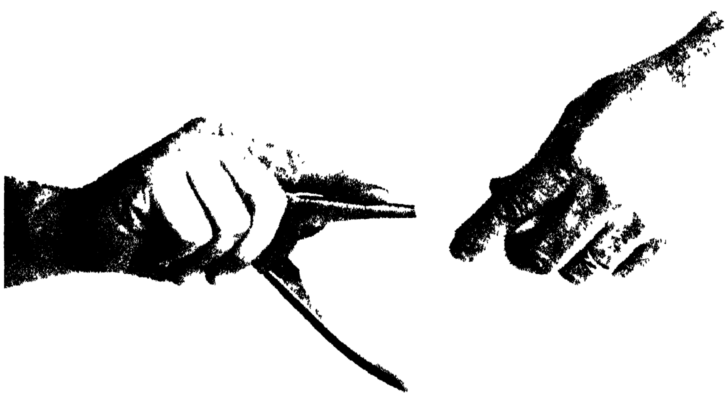


Fig. 8. Punching a hole in the plug of gelignite, showing the correct position of the hands and gelignite when making the hole with crimpers.

Fig. 9. –Inserting the capped fuse in the gelignite.

EXPLOSIVES IN AGRICULTURE.

If they are not too big they can be got rid of by gelignite. To do this take one plug of gelignite, attach a No. 6 cap and about 3 feet of tape fuse, place the charge on top of the boulder, and cover the charge with a "poultice" of moist clay. Make a nick in the end of the fuse and insert a small shaving of gelignite, touch this with a match and get well away. The result of the explosion will be that the boulder has been split in three or four pieces and can then be easily thrown on a dray and dumped out of the paddock. This will prove that the action of gelignite strikes in every direction, and not only upwards as is usually thought.

Post Holes.

Every man on the land knows what it is to put up a line of fencing at a time when the ground is hard. Under such conditions the use of half a plug of gelignite for each post hole, and one plug for each strainer, gate and corner post hole, will be found of great advantage. Use No. 6 caps and tape fuse, and apply the same method as that suggested for tree planting. It will be found that the work is quicker and far cheaper.

Hibbertias AS FODDER PLANTS.

Hibbertias are native plants forming very small or medium-sized shrubs, which are very common in Australia, being readily recognised by their profusion of bright yellow, almost buttercup-like, flowers.

Recently the Rev. H. M. R. Rupp, of Barraba, wrote as follows:—

"Despite the sharp pointed leaves of *Hibbertia acicularis*, it is highly approved here for sheep It is abundant in the district, but it is always cropped so close to the ground that good specimens are rare."

This is a plant that is common in the Sydney district and in the State generally.

While no case of *Hibbertia* having been injurious to stock has ever come under my personal notice, I have not heard before of any species being looked upon as a useful fodder plant, and the attention of readers of the *Gazette* is invited to the matter.

In Queensland, Mr. F. M. Bailey has reported three species to be poisonous to stock. In the annual report of the Department of Agriculture of Queensland for 1890 91, page 44, *Hibbertia glaberrima* F.v.M. and *H. longifolia* F.v.M. were sent to that gentleman as suspected poison plants; but no evidence was adduced.

In the *Queensland Agricultural Journal* for June, 1899, pages 163 and 165, Mr. Bailey reported *Hibbertia Bennettii* Bail. as poisonous to stock. It is peculiar to Queensland, and at Irvinebank, in that State, it is recorded that the plant is known locally as "Arsenic Plant," and that "it is exceptionally poisonous to stock"; but no evidence is quoted.

So that, as regards *Hibbertias*, it is desirable not only that we should gather evidence in regard to the use of these plants as forage, but also inquire as to the alleged poisonous properties of any of them.—J. H. MAIDEN.

Artichokes v. Sweet Potatoes for Pigs.

At a time when pig values remain high, with every prospect of continuing so, the question of making suitable provision in the shape of easily-grown crops needs consideration.

A correspondent from the North Coast, with this object in view, asks the relative value of artichokes and sweet potatoes for feeding pigs, or to put it another way, would an acre of artichokes fatten more pigs than an acre of sweet potatoes?

To answer such a question one would need to know the class of soil on which it was intended to grow the crop, as artichokes thrive best in good mellow loams or soils in which the ordinary potato flourishes, while sweet potatoes prefer light sandy loams.

In making the comparison it must be borne in mind that average crops of artichokes are not likely to yield as well as those of sweet potatoes. While 6 to 8 tons of artichokes would be considered a good crop, yields of sweet potatoes have totalled 22 tons per acre, and the average may be set down as from 10 to 12 tons.

In an experiment conducted at the Hawkesbury Agricultural College in 1907, the variety "Pierson," produced 11 tons 8 cwt. of table potatoes, and about 11 tons of pig potatoes; while "Pink" gave a total of 17 tons; "White Maltese," 14 tons, and "Big Stem Jersey Yellow," 11 tons.

In addition it should be noted that the tops or vines of sweet potatoes may be fed to cows or pigs with perfect safety. In many districts animals are allowed to graze on the crops with satisfactory results. In fact, the vines are much more nitrogenous than the roots. If the crop is fed off in this way, the ration is much better balanced than when the roots are fed alone.

The contrast between the analysis of artichokes and sweet potatoes may be seen from the following, and that of the ordinary potato is inserted for comparison:—

	Carbohydrates.	Fat	Protein.	Albuminoid Ratio
	per cent.	per cent.	per cent.	per cent.
Artichokes	16·7	·2	2·5	1 to 7
Sweet potatoes (roots) ...	24·7	·4	1·5	1 to 17
Potato (for comparison)...	17·7	·1	2·1	1 to 8·6

The artichoke requires less labour in planting, but from 4 to 5 cwt. of seed per acre is needed, while the sweet potato is planted by means of cuttings, and to produce these about 1 cwt. of potatoes is necessary.

On the North Coast it may safely be said that the sweet potato is the more profitable, especially as it can be stored much more satisfactorily than the artichoke.

In each case, and especially in that of the artichoke, it must be remembered that eradication is somewhat difficult, and the crop should be grown on odd portions of land, not likely to be required for general cultivation.

Neither of the crops alone can be considered a complete ration for fattening purposes, and they should be supplemented with lucerne, maize, barley, oats, rye, cowpeas, &c.

Design for a Farmer's Cottage Residence.

A. BROOKS, Works Overseer.

A CORRESPONDENT, in favourably referring to the plans of cottages published under the general title of "Attractive Rural Homes" in previous issues of the *Gazette*, commented on the absence of a good ground plan, and the best general and economical means of construction suitable for a starter. In such a case it would be an advantage to arrange the plan so that a few rooms could be built first and then added to as required, without interfering with the appearance of the place. This would prevent, what so often happens, the home from becoming a cluster of small buildings, which in many cases are detached, and thus cause much labour to keep in order.

Notes on the Plan.

In offering this plan for a farm home residence, one that can be erected as it were by instalments, the fact that it is necessary to make the job look finished at the completion of each section has been kept in view The roof can be gabled and finished with a simple barge-board, which will give a finished appearance. Another and a very important point nowadays, the cost of construction, has also been carefully considered.

A large house, such as this would be when complete, must necessarily cost a fair sum to erect, the average cost per room usually being from £120 to £140, according to locality and finish, and including verandahs, laundry, bath and store rooms, which are considered as being provided in all plans.

The sizes of the rooms here shown are of fair average dimensions, but without alteration of the design they can be enlarged—for instance, the dining and sitting rooms could be made wider from front to back, and so could the back hall if desired.

Material.

Provision is made for the use of light material, but the building would still be strong and durable. Of course, any heavier materials may be used, such as bricks, stone, or concrete, but it is considered that the building may be erected in a district miles from rail or wharf, where the cost of cartage would be a considerable item. Then, again, with such material fewer trades may be employed at the work; in fact, a good carpenter could do the bulk of it. For the foundations, wood blocks may be used, but, as the chimneys and fireplaces have to be of brickwork, the house would be more comfortable in winter, and the job would look better, if a close foundation wall were provided on the outside, with brick piers under the internal walls.

The walls are shown to be of wood frame, covered externally to a height of 3 feet 6 inches with weatherboards, and the remainder with fibro-cement sheets.

Internally the covering would be of fibro-cement 4 feet high, and wood veneer sheeting above, with ceilings of the same material, and the whole finished as panelled work, with fillets covering the joints of the sheets. This

material is strong when fixed, and can be finished in either paint or varnish, and makes a good class of work at a reasonably low cost.

For such rooms as the bath-room, larder, kitchen, laundry, and store room fibro-cement sheeting would be fixed internally the full height of walls.

The roof may also be covered with slates of this material, which are now extensively used, and proving satisfactory, but the galvanized-iron roof is the most lasting, and, therefore, in back country districts, where repair work requires to be avoided as much as possible, the iron roof is recommended.

By coating it with one of the roof-coating paints, and providing good ventilation and boarding under the battens, it is a cool roof. Of course, a good pitch must be given to the roof.

Ventilation of the rooms can be provided for, by inserting gratings on the outer face of the walls at the floor level, and about 6 inches under the ceilings, also on the inner face in each room at about 4 inches under the ceilings. Larger openings must be made in the foundation walls, having strong wire netting on frames, affording not only provision for ventilation, but (as a further precaution against the white ant) also for the admission of light. The foundations under the whole building should be lime-washed, and the ground surface left properly cleaned up. A door opening should be provided at the most convenient position for gaining admission under the building to inspect when desired

Progress of Building.

The first part to be erected might be that indicated on the plan by open lines, viz.:—The sitting-room (which may be used as a best bedroom), the dining room, kitchen, larder, No. 1 bedroom, and back verandah, which provides space 13 feet x 10 feet 6 inches for sleeping out purposes, and the verandah continued round the back. The probable cost of erecting this section would be about £650. This afterwards covers in the laundry, porch, and store room, which would be the second portion to be erected, as indicated by blocked-in lines, and finally the extra bedrooms, permanent bath-room, and enclosed court-yard, as shown by hatched lines, which would complete the residence.

The probable cost of this work, as stated, would be from £1,050 to £1,350, according to the materials used and the locality, the lower figure being the probable cost for the work being done with the lighter materials specified, and near the railway at about 250 miles from Sydney.

Water Supply.

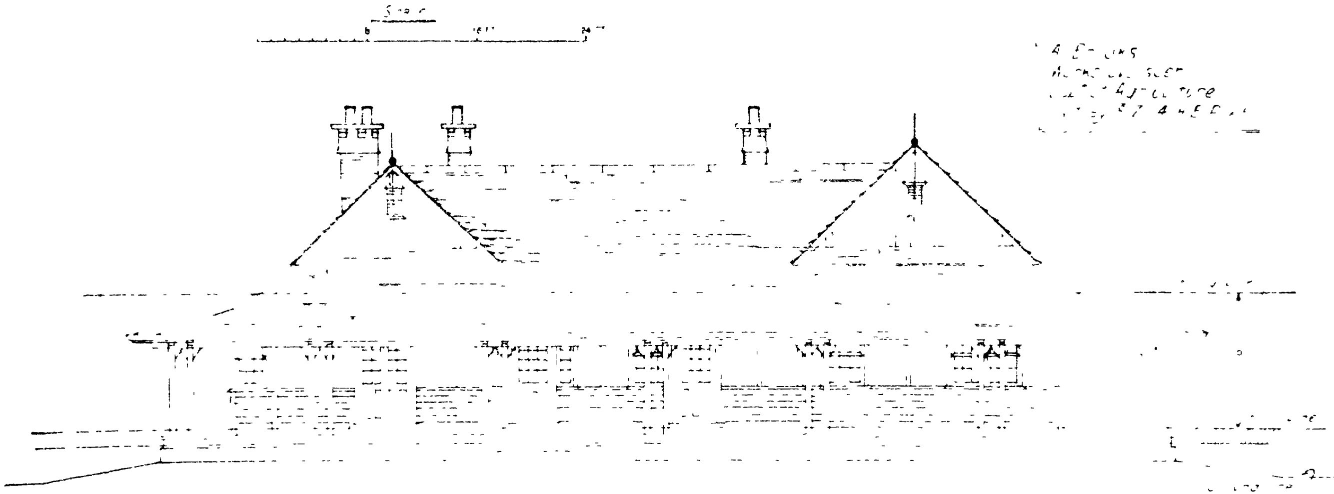
For the first section of the house, three 1,000 gallon tanks would probably be sufficient, but, as soon as possible, there should be provided an underground tank, with either a hand or a windmill pump to raise the water to an elevated tank to supply all requirements.

Drainage.

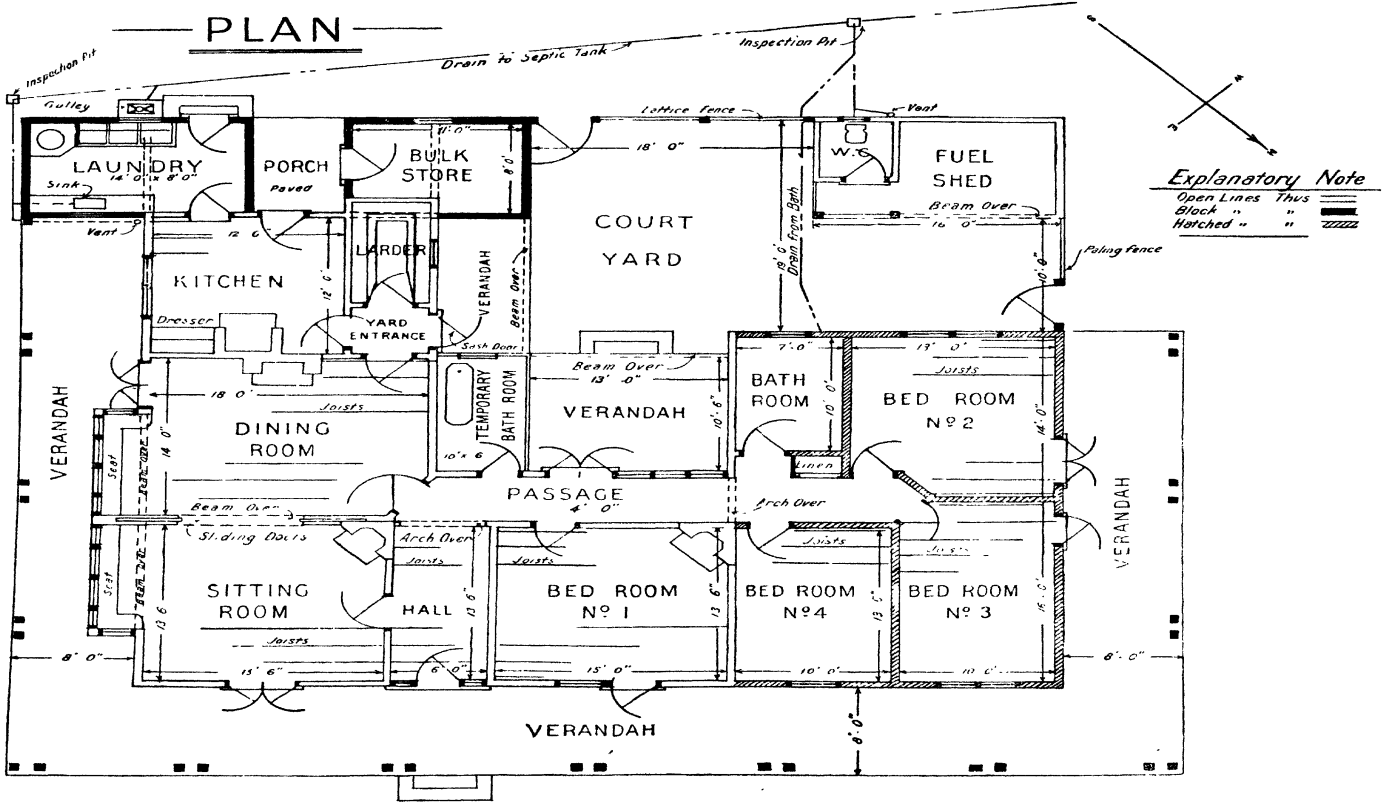
The whole drainage should be conducted into a small septic tank set about 2 chains from the house, and delivering the effluent into the vegetable garden or other cultivation. These tanks can now be had in various sizes from the State Monier Concrete Works ready to set in position and connect to the drain pipes.

DESIGN FOR FARM RESIDENCE

To be Built either as a Whole or in Sections



NORTH EAST ELEVATION



PLAN OF FARM RESIDENCE, TO BE BUILT EITHER AS A WHOLE OR IN SECTIONS.

Some Observations on Arsenical Dipping Fluids.

LIONEL COHEN, F.C.S., Department of Agriculture.

I.—Preparation of Standard Dip-fluid.

It may be first of all necessary to explain that the dipping fluids referred to in this article are used in the treatment of cattle and horses for the purpose of destroying the cattle-tick (*Margaropus australis*), a pest not only obnoxious on account of the mechanical injury it inflicts upon stock (tick worry), but much more so by reason of its being the carrier of a particularly fatal disease known as Tick-fever, or Redwater.

Experience in Queensland, in the United States, and in South Africa has shown that the dipping of stock in a solution containing 8 lb. arsenious oxide (white arsenic), 3 lb. caustic soda, soap equivalent to 8 lb. tallow, and a gallon of Stockholm tar, in 100 gallons of water, is in every respect satisfactory in killing, within five days, such ticks as they may be infested with.

In this dipping solution the arsenic is primarily the toxic agent, requiring the soda merely to render it soluble in water; but it is found that a simple solution of arsenite of soda is not satisfactory, and that the presence of some emulsion is required, which no doubt counteracts the protective action of the natural grease of the skin and hair, and thus enables the arsenic to penetrate freely and equally to all parts. While it is held by some that the use of Stockholm tar is indicated solely in order to render the fluid objectionable in odour and taste, and thus prevent fatalities through stock drinking it, this substance appears to have some slight specific action on the tick itself, or as an adjuvant to the action of the arsenic. The combination of the above ingredients into a homogeneous and stable fluid by the stock-owner presents no little difficulty, to say nothing of the time occupied in boiling, cooling, &c., and, therefore, several concentrated medicaments have been placed on the market, which merely require dilution with water in certain proportions to make an 8 lb. dipping fluid. It is, however, safe to affirm that not one of these proprietary mixtures is completely satisfactory,* and the reason of this is chiefly—in the case of our own State at any rate—that it is impossible to mix the tar and soap with the arsenic in a concentrated form without the two sets of ingredients separating out into distinct layers, thus rendering accurate mixing a matter of extreme improbability. Again, those proprietary fluids examined by the writer, and found in other

* J. C. Brünnich, Queensland Government Agricultural Chemist, "Notes on Dipping Fluids," Journ. A.A.A.S., 1909.

respects to be fairly up to standard, have, in each case, contained no soap at all, thus omitting a very important component of the standard formula.

With a view to overcoming the difficulties attending on the one hand much labour and loss of time in preparing the medicament from the raw materials by boiling, &c., at the dip itself, and on the other the use of a concentrate of varying strength and deficient in certain necessary ingredients, it became essential for the Stock Department to prepare such a concentrated medicament that would form on dilution a product precisely according to the regulation formula. It was found impossible, for the reasons stated above, to incorporate the soap into the other ingredients, and it was consequently decided to make the saline ingredients and the emulsion of tar and soap separately. The arsenic and soda solution is put up in ordinary iron drums, labelled "Concentrate." The tar and soap mixture, prepared by a special process which renders it reasonably fluid at ordinary temperature and readily miscible with cold water, is sent out in 4-gallon lever-top containers, labelled "Emulsion."

For convenience in spraying small herds, the medicament is also issued in small screw-top cans, sufficient to make 100 gallons of fluid. This preparation is now used exclusively in Government dips in place of the previous proprietary mixtures. Being standardised analytically in the laboratory before issue, its strength is always the same, and when diluted in the proportion of 2 gallons "Concentrate" and 1 gallon "emulsion" to 400 gallons water, will produce a homogeneous solution, containing precisely ·2 per cent. of arsenious acid. In thus preparing the dip for use, the following precautions should be borne in mind:—

(1.) The "concentrate" and the "emulsion" must never be mixed together, but added to the water separately.

(2.) Stir the fluid thoroughly after adding each of the ingredients.

(3.) Measure the "concentrate" carefully in vessels kept specially for the purpose.

(4.) The "emulsion" should be well stirred with a batten before measuring out.

(5.) The strength of the dip-fluid will depend on the correct measurement of the water used.

II. Maintenance of Standard Strength.

In the employment of such an arsenical fluid for the immersion of stock it is found that—

(*a*) The total percentage of arsenic gradually decreases proportionately to the number of stock dipped.

(*b*) If the dip is not much used, the percentage of *arsenious oxide* rapidly decreases, while at the same time the *total arsenic* suffers no such decrease.

(*c*) Observations of infested cattle dipped in such a fluid as is referred to in (*b*) disclose that it quite fails to kill the ticks.*

* J. C. Brünnich, *loc. cit.*, and others.

We will now endeavour to explain these phenomena, and discover what remedies may be applied in order to counteract their effects.

Fluid weakened by Dipping.

Case (*a*) is a very simple matter. A series of analyses of about thirty successive samples, taken at more or less regular intervals from each of some sixty different baths in fairly constant use, has proved beyond doubt that—other things being equal—dipping lowers the arsenical strength. This loss of arsenic may be caused partly by absorption into or chemical combination with the hair and hide, and partly by addition of moisture and excreta to the fluid; but calculations based on the figures obtained show that each hundred head weaken the fluid by about 1 lb. of arsenic in a 3,000 gallon dip. In other words, it is necessary, in order to maintain the strength of any bath, to add 1 lb. of arsenic after each hundred head have been dipped, or, in practice, 1 quart of concentrate. As, however, in dry hot weather the increased evaporation of water partly compensates for such loss of arsenic, only half this proportion is used.

Oxidation

With regard to cases (*b*) and (*c*), it should be first explained that there are two oxides, or forms of combination with oxygen, of the element arsenic, namely, the trioxide, *arsenious oxide*, in which two molecules of arsenic are combined with three molecules of oxygen, and the pentoxide, *arsenic oxide*, in which two molecules of the element are combined with five molecules of oxygen. The trioxide is also called arseni*ous* acid, having the property of combining with bases to form arsen*ites*, while the pentoxide or arsen*ic* acid forms arsen*ates*.

The trioxide may be converted into the pentoxide in the laboratory by treatment with certain powerful oxidising agents, and the pentoxide may also be converted back again to the trioxide by many reducing substances, which take away part of its oxygen. It has also been quite recently discovered* that oxidation of arsenites may be brought about in dilute solution by means of bacteria, which are present in the air, water, excreta of animals, and so forth. When such oxidation takes place there is no loss of total (or elementary) arsenic, but only of arseni*ous* acid, and this loss is associated with a corresponding increase in the arsen*ic* acid.

The two oxides (or acids) differ considerably in their properties; suffice it to say that arsen*ic* oxide has more pronounced acid characteristics than arseni*ous* oxide, neutralising alkalies and forming stable salts with them. But the chief significance of oxidation, as far as our subject is concerned, lies in the fact that sodium arsenate is a great deal less toxic than sodium arsenite, especially to cattle ticks; and, therefore, oxidation in a dip-fluid is synonymous with inefficiency.

* A. V. Fuller, "Spontaneous Oxidation of Arsenical Dipping Fluids." Circular 182, B.A.I., United States, 2 November, 1911.

It is obvious that if arsenate is less toxic than arsenite, and the minimum percentage of arsenite necessary to kill ticks is ·2, then the conversion of any part of this percentage into arsenate must necessarily prevent such lethal effect.

J. C. Brünnich (*loc. cit.*) says " . . . a dipping fluid was tested and was found to have hardly any effect on the ticks, although it contained nearly 10 lb. of arsenic. A more exhaustive analysis revealed the fact that nearly all the arsenic was in the form of *arsenate.*" This experience has since been confirmed in other countries, and experiments conducted by the writer on ticks *in vitro* tend to corroborate it.

With the limited number of ticks available an attempt was made to compare the effect of certain substances on them, under conditions which, though far from similar to natural conditions, appeared the nearest approach to them under the circumstances of the experiment. The results are thus merely to be taken as indications.

Several layers of filter-paper were placed at the bottom of small beakers and four engorged female ticks placed in each. Sufficient of the different solutions to completely submerge them was poured on to the ticks and allowed to cover them for two minutes. The fluids were then poured off, leaving the ticks in contact with the saturated filter paper and allowed to remain for several hours at a temperature of 10 degrees C. The effects at various intervals were as follow:—

	After ½ Hour.	1 Hour	2 Hours	5½ Hours.
Water alone (control) ..	Alive ..	Alive ..	Alive .	Alive
Saturated solution borax ..	Alive .	Alive	Alive	Alive.
Saturated solution quinine sulphate	Alive .	Alive	Alive .	Alive
½ per cent. solution sodium carbonate.	Alive .	Alive .	Alive ..	Alive.
Departmental dip, half oxidised ..	Alive	Slightly affected	Alive	Alive.
Departmental dip, 8 lb. arsenious oxide	Slightly affected.	Apparently dead	Dead .	Dead.

The majority of the live ticks subsequently oviposited.

The fact that an oxidised dip is an inefficient tick-destroying agent being well established, it remains to be seen to what extent oxidation is prevalent, the influences that control it, and the means, if any, of preventing it.

Factors Influencing Oxidation.

The following table gives the percentages of arsenious acid converted into arsenate in samples taken at intervals from some of the dipping-baths under Departmental control, and serves to show the effect of dipping on oxidation.

TABLE showing Effect of Immersion of Cattle on Rate of Oxidation; giving date of sampling; percentage of arsenious oxide converted into arsenate, and number of stock dipped.

Dip	Charged.						Cattle Dipped.
A	Oct. 22 Nil.	Nov. 17 ·040	Dec. 5 ·067	Feb. 24 ·069	....	..	232
B	Mar. 4 Nil	Mar. 26 Nil.	April 9 Nil.	April 29 Nil	June 5 Nil.	..	2,885
C	Sept. Nil.	Sept. 24 ·022	Oct 10 ·030	Nov. 11 ·084	Nov 25 ·076	....	408
D	Oct. 15 Nil.	Oct. 23 ·017	Dec 3 ·027	Dec 16 ·047	Dec. 31 053		Unused.
E	Dec. 2 Nil.	Dec 16 017	Jan 12 ·056	Feb 7 ·100	April 10 ·031	..	To Feb. 7 140 To Apr. 10 980
F	Feb 28 Nil.	Mar. 28 ·033	April 25 043	June 6 088	Aug 22 ·113	Sept 17 ·150	1,140
G	Feb 12 ·009	Mar 16 ·024	April 14 045	April 30 ·050	May 30 ·133	June 21 ·156	300
H	Oct 30 Nil	Mar. 10 140	June 1 ·170	..	.	...	206
J	Jan. 31 Nil.	June 4 ·113	Oct 2 224		..		88
K	Sept. 13 Nil.	Oct 15 Nil.	Oct 30 Nil.	Dec 12 Nil	Feb. 20 Nil.		2,824
L	Feb 23 Nil	Mar 3 Nil.	April 21 089	April 27 106	June 21 ·158		367
M	Aug 28 Nil.	Oct. 28 Nil.	Nov 26 Nil	June 29 Nil	Mar. 4 Nil.	.	3,900

Dipping baths B, K, and M are typical of the majority of those in New South Wales, and show no arsenate at all for several months after being charged; but in each case it will be seen that a comparatively large number of cattle have been dipped

The others in the table, however, show considerable loss of arsenite, and they have all been used very little These results corroborate the observations of Lewis* and others, that frequent use prevents oxidation. The lesson to be learnt from them is, that if we wish to keep our dips efficient from a tick destroying point of view, it is necessary to keep them constantly in use; and it follows as a corollary that there is considerable risk in erecting new dips unless there is every prospect of at least 300 or 400 cattle being put through them per month.

Some Theoretical Considerations.

In studying the changes that take place in dip-fluids many interesting theoretical considerations arise. In the light of Fuller's discovery† of the biological origin of oxidation (loss of arsenite due to bacterial action), and the further observation of Williams‡ and the writer that reversion of arsenate

* *South African Agricultural Journal*, May, 1914.
† A. V. Fuller, *loc. cit*
‡ *South African Agricultural Journal*, Jan., 1913.

to arsenite may, under certain conditions, take place, a critical examination of the results of nearly 2,000 analyses of fluids by the writer tends to demonstrate the following facts :—

(1.) The micro-organisms causing oxidation of arsenite are in all probability present in the air or in the water from which the dip-fluid is prepared. This is evidenced by the fact that freshly-prepared unused dips are the most prone to oxidation. Further, a 3 litre sample of fluid,* prepared from a proprietary medicament consisting of plain arsenite of soda solution, was taken before any cattle had been dipped, and was kept in a glass stoppered "Winchester Quart" bottle. At the time of sampling, 15th May, 1912, it contained ·220 per cent. arsenious oxide; quantities of this taken from time to time (keeping the main sample well stoppered meanwhile) showed gradually decreasing amounts of arsenite until in twelve months it had entirely disappeared, having been all changed into arsenate. At the same time the fluid in the dip itself, through which several thousand stock had passed, was practically free from arsenate.

It appears, therefore, that only an inappreciable amount of nitrogenous pabulum is required for the growth and activity of the specific organism causing oxidation.

(2.) The theory of a specific reducing micro-organism is not required in order to explain the spontaneous reversion of arsenate to arsenite. It is noted that such reduction is invariably associated with the offensive odour of putrescent conditions, such putrescence being that of excrementitious matter from the bodies of the cattle, or from the soil saturated with urine and faeces common in the "yards" in wet weather. Under the influence of ordinary putrefying bacteria the organic matter is converted into ammonia, amines, &c., and reducing gases, such as hydrogen and sulphide of hydrogen; these latter having the chemical property in themselves of abstracting oxygen from arsenate and reducing it to arsenite. The putrescence is always associated with an augmented alkalinity of the fluid. That the latter is due to ammonia and compound ammonias may be shown by determining the free alkali of dirty fluid before and after boiling. A sample of much-used dip with an alkalinity equivalent to ·20 per cent. of sodium carbonate, gave after prolonged boiling an alkalinity of only ·11 per cent. Red litmus paper placed in the escaping steam was rapidly turned blue.

A high alkalinity is thus a rough measure of the organic impurity in a dip.

(3.) Contrary to experience in South Africa, we find oxidation more prevalent in winter than in summer, no doubt principally on account of the inhibitory action of low temperature on putrefactive processes.

(4.) It is essential, in order to maintain the standard strength of dip fluids, that there should be no delay in analysing the samples as soon as possible after they are taken.

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* Woodlands Dip, Casino.

Experiments have shown that, in most cases, samples in bottles oxidise much more rapidly than the dipping bath itself, and it is thus obvious that delay in analysis would be attended with misleading and erroneous results.

(5.) The advice of Fuller (U.S.A., *loc. cit.*) to "discard a dip which is more than a few weeks old, unless there is positive evidence that it retains its original concentration of sodium arsenite"; and that of Lewis (*Agricultural Journal of South Africa*, May, 1914) to "continue using a dip unless there is strong evidence that it has altered in composition," are neither applicable to our own case. Continual systematic analysis by the Stock Department renders any such fixed rules unnecessary. Certainly, the American rule holds good when a dip has not been in use for some time, but it would be unwise to discard in the case of a dip in constant use until there is evidence of oxidation.

Factors Influencing Arsenical Strength.

Regular analyses are a great safeguard in maintaining an efficient condition of dipping-fluids, but there are various factors—some of them very often overlooked—that have a direct influence on arsenical strength.

It may be well to bear in mind that-

Firstly, a dip may become *weak* by

- (*a*) Passage of stock;
- (*b*) Access of rain-water;
- (*c*) Under-estimation of cubic capacity of bath or filling tank;
- (*d*) Oxidation.

And, secondly, it may become *strong* by

- (*e*) Evaporation;
- (*f*) Over estimation of cubic capacity of bath or filling tank;
- (*g*) Reversion of arsenate.

The remedy in the case of (*a*) is, as explained before, to add a pint of concentrate after each hundred head have been dipped. The sources of irregularity in cases (*b*) and (*e*) may be overcome by carefully making a note of the exact depth of the fluid after using. If on subsequently resuming operations it has increased, then it must be assumed that storm-water has got in, and an equivalent quantity of concentrate must be added before dipping. If the depth has decreased, and it is certain that the dip is not leaking, water must be run in up to the original mark With regard to cases (c) and (*f*), unfortunately there is a good deal of discrepancy in the sizes of the various dips, and it is too often assumed that they are uniform. This is not always the case, and linear measurements of all new dips should be carefully made and the cubic capacity calculated at different heights. When there are 400-gallon filling tanks attached to the dip the matter is easy, as it is only necessary to measure the tank itself.

An approximate estimate of the capacity of any dip may be obtained by the following formula :—

$$\text{Capacity in gallons} = \frac{\text{Ta} + \text{Ba} + 4\ \text{Ma}}{6} \times \text{h} \times \frac{25}{4}$$

Where Ta = area (length × breadth) at height of dip level or any given height.

Ba = area at bottom of tank.

Ma = area half-way down, or average of top and bottom lengths multiplied by average of top and bottom widths.

All measurements being given in feet.

The only preventive measure so far known in regard to (*d*) is constant use, but when is is found by analysis that portion of the arsenite has been lost by oxidation, it is necessary to add sufficient concentrate to make the total arsenious oxide up to 8 lb. When, however, the arsenate increases to more than 4 or 5 lb., it is best—in order to avoid scalding the cattle through excess of saline material—to discard the fluid altogether and re-charge.

When, for any reason, a dip that has been seldom used, (*g*), and has therefore become oxidised, is utilised for the immersion of large numbers of cattle, part or all of the arsenate is changed back to arsenite This may make the fluid too strong, and it will then be necessary to add a certain quantity of water, indicated by the result of analysis, to compensate for such increase of arsenite.

Electric Incubation.

For a considerable time past Mr. Cuthbert Potts, Lecturer in Chemistry and Physics at the Hawkesbury Agricultural College, has been conducting experiments in the application of electricity to incubators, and has devised a new method of wiring and also an improved form of incubator for this class of heating. The method has in some cases resulted in very good percentages of hatching of fertile eggs, and where electricity is easily obtainable, a in some parts of the suburbs and also on the Yanco Irrigation Area, there should be decided advantages in the use of such a heating medium. Mr. Potts' conclusions on the results of the experiments to date are :—

1. An incubator of good type has been designed and made.
2. A perfect control for heating by electricity has been tested.
3. The machine is reliable, clean, labour-saving, and an effective incubator.
4. The tests in incubation have opened up a wide field.

With the electric machine it would seem that stronger chicks are obtained, while a higher percentage hatch is secured, if the calculation is based on the truly fertile eggs. This can scarcely be attributed to any direct effect of the electric current, but is rather due to the better and healthier atmosphere surrounding the machine.

Fungus and other Diseases of Citrus Trees.

G. P. DARNELL-SMITH, B.Sc., F.I.C., F.C.S., Biologist, and
EWEN MACKINNON, B.Sc., Assistant Biologist.

THE diseases of orange orchards are for the most part due to fungus parasites, which may be kept in check by sprays. Unfortunately spraying is not usually adopted until a disease has made its appearance; sometimes, only those trees on which the disease has become manifest are treated, and more often it is not carried out systematically even upon those.

It would probably pay to spray the whole of every citrus orchard at least once with lime-sulphur just after the fruit has set. But even before that stage there is something the progressive grower should do—he should cut away all affected parts, and as the fungal hyphæ have been traced deep into the living tissue, he should not hesitate to cut as much as 4 inches of live wood below the affected part. There is no doubt whatever that this policy would pay—rigorous as it appears—diseased wood being the chief source of infection, and practically unaffected by any spray. The future shape of the tree and the time the operation takes to carry out are but secondary considerations. All such prunings must be burnt.

Growers have a tendency to hope that one spraying of some particular specific will prove a complete remedy when disease breaks out. Those who do so ignore the teaching of biology, that the first essential is to remove the source of infection. The cost of thoroughly overhauling the trees, and of removing all infected wood in the first instance, must be looked upon as an investment which will return good interest if thoroughly done. Massee, speaking of apple scab, says:—"The young apples are mostly infected by spores produced upon the leaves. But the leaves could not become infected except by spores produced on diseased shoots, consequently diseased shoots are the source of all the mischief; hence, the most natural thing to do under the circumstances is to remove and burn all such diseased shoots. This is what I have advocated, but I have been told by a professor of mycology and a professor of agriculture, independently and in public, that this is not practicable. I am not convinced. I believe that it is as practicable to remove the dead shoots from the tree, as it is to remove the apples." In regard to the treatment of diseased trees we agree with Massee.

It has been stated above that the fungi causing disease are parasites. A parasite is entirely dependent, as a rule, for its existence on some particular organism or limited group of organisms, which constitute its host or hosts. So long as the nutritive or multiplicative function is the most important one in the life of a parasite, and until it has matured its propagative phases, the death of the host is the greatest disaster that can befall it. The ideal host, from the point of view of a parasite, is one that is "tolerant" to

it—that is to say, one that can support the presence of the parasite and keep it supplied with the nutriment it requires, without suffering in health and vigour to any marked extent.

The effect produced by a given species of parasite upon a given species of host is a specific reaction, which differs markedly when one of the two *dramatis personæ* is changed. Further, any alteration in the condition and surroundings of the host affects the parasite. Hence a particular disease is more prevalent in one district than another, and one may even find trees in an orchard suffering from disease, and other trees not far removed able to withstand the attack. The more vigorous the tree the less chance there is of its being attacked by disease, and the greater chance there is of it, if attacked, throwing it off or "growing out of it." The practical moral of the foregoing is cultivate and manure. When it has been determined that a disease is caused by a fungus, the sprays recommended are Bordeaux mixture or lime-sulphur. The frequency of application must depend on the time of the year and the weather conditions. Bordeaux mixture is very easily prepared, and generally speaking appears to have a more lasting effect than lime-sulphur, but it renders the foliage somewhat harsh, and has a certain detrimental action in retarding the free growth of the tree. Lime-sulphur can be applied more freely and more often than Bordeaux mixture; it leaves the foliage bright and glossy, and only when applied in excessive strength will it damage the appearance of the fruit.

Theoretically, the ideal method of protection from fungus attack would be to keep fruit continually coated with a fungicide. Practically this is impossible, because (1) the fungicide when applied even in a spray always runs together into droplets, owing to the waxy nature of the exterior of the fruit; and (2) the fruit is always growing, and the fungicide, being non-elastic, soon cracks. More is to be expected from frequent spraying with a dilute fungicide than from one drastic spraying with a strong one.

The following sprays are recommended for fungus diseases on citrus trees:—

Lime-sulphur Solution:

53 lb. freshly-burnt quicklime.
100 lb. flowers of sulphur.
50 gallons of water.

Weigh out the lime and sulphur, place in an iron boiler and add 25 gallons of water; stir thoroughly. There will be a certain amount of spurting as the lime slakes; avoid being splashed. Now add a further 25 gallons of water, and boil for one hour. Restore the water lost by boiling so as to keep the whole up to 50 gallons. This concentrated spray should be used shortly after making. For use on citrus trees, dilute 1 gallon of the concentrated lime-sulphur solution with 20 gallons of water.

Bordeaux Mixture:

Copper sulphate (bluestone), 6 lb.
Freshly-burnt quicklime, 4 lb.
Water, 50 gallons.

Measure out 25 gallons of water. Pulverize the bluestone and place it in a coarse sack. Suspend the sack just below the surface of the water until all the bluestone has dissolved. Slake the lime in a small quantity of water; then add 25 gallons of water and stir. Pour this milk of lime slowly, in a fine stream, into the solution of bluestone. When made, hold a bright steel knife for one minute in the solution. If a deposit of copper is found upon the knife the solution is not safe to use upon foliage—it will "burn" it—and more milk of lime must be added until no deposit of copper is formed upon the knife-blade.

Ammoniacal Copper Carbonate:

Copper carbonate, 5 oz.
Ammonia (26° Baumé), 3 pints.
Water, 50 gallons.

Mix the copper carbonate in a wooden pail with sufficient water to make a thick paste; next add the ammonia to dissolve the paste, and when all is dissolved dilute with water to make 50 gallons.

This preparation is frequently employed where a strong fungicide is needed and where the colour of the Bordeaux mixture renders it objectionable. The ammoniacal solution discolours foliage and fruit to only a slight extent.

Blue Mould.

This is usually due to the presence of fungi belonging to the genera *Penicillium* and *Aspergillus*. These are not true parasites, but they occasionally make their appearance on fruit hanging on the trees in a very wet season, causing it to quickly rot throughout. The spores are universally distributed, and any abrasion of the skin or any bruise may form a point of attack where the fungus spores can lodge and develop. The fungus grows with great rapidity, and produces enormous numbers of spores. One rotten or infected orange in a case may be the source from which infection spreads throughout the whole. While very little damage is done to fruit on the trees, enormous damage sometimes occurs owing to these fungi rotting fruit in transit.

The best remedy is to avoid most carefully any injury to the skin, and then to wrap each fruit in paper; the spores are thus prevented from spreading, and the disease is limited to fruit infected before it is packed. There is no doubt that the careful wrapping up of each fruit in paper and the periodical spraying of packing-houses and fruit-cases with formalin solution—1 part of commercial formalin in 100 parts of water—would greatly limit the loss that arises from the decaying and rotting of fruit in transit. The paper used for wrapping should be carefully stored, and only the required quantity taken out of store at one time, for if it is allowed to lie about anywhere the paper itself may become infected with spores.

Sooty Mould or "Fumagine."

This disease (due to *Capnodium citricolum*, McAlp.) is, in the aggregate, very injurious. Trees largely covered with a sooty fungus are sometimes

met with. It is dependent on certain insects (scale insects and aphides) for its spread, and as these multiply, so it also increases in amount.

It does not penetrate the tissues, but grows superficially over the surface of living leaves (particularly the upper surface), branches, and fruit. It is harmful indirectly, the black fungus covering interfering with the process of assimilation in the leaves, by preventing the access of light and generally "choking" them. The fungus lives upon the so-called honey-dew or sugary secretion of scale insects, such as Indian wax scale (*Ceroplastes ceriferus*), Brown Olive Scale, &c.

The fungal hyphæ are dark-greenish black in colour. They reproduce themselves by spores (conidia) abstricted from the hyphæ, also by ascospores, produced in little sacs (asci).

Remove scale insects by fumigation or by spraying with carbonate of soda —1½ lb. of washing soda dissolved in 4 gallons of water. The fumagine will then disappear also. Its disappearance will also be expedited by spraying the tree later with a dilute solution of starch (1 lb. starch made into a paste with cold water and 4 gallons of boiling water added).

Melanose.

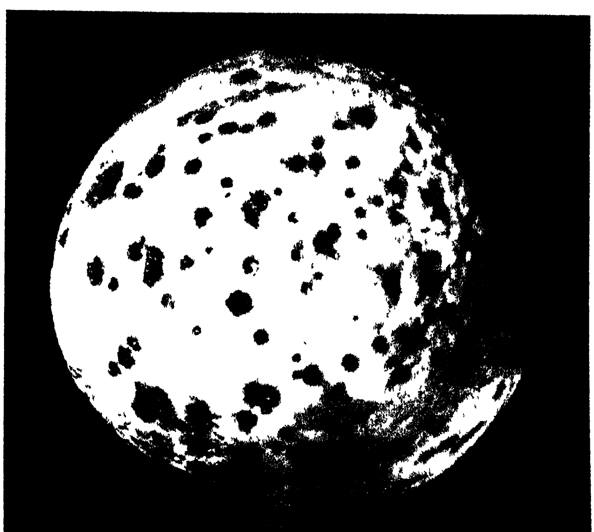
A disease has been described in Florida, due to a fungus, *Phomopsis citri*, Fawcett, which gives rise to Melanose and "Stem-end Rot." In New South Wales a fungus, *Cladosporium brunneo-atrum*, has been described by MacAlpine as giving rise to a similar disease. The appearance of the disease to the naked eye is the same in the two cases, viz., numerous small dark-brown spots on the surface of the orange rind, which have, as a rule, a peculiar distribution. They usually occur in more or less definite lines, which approach and join at their extremities in curves; the outline appears like that which would be traced by drops of rain or dew running over the fruit. As far as the disease in Florida is concerned, there is a distinct connection between the water that trickles over the fruit and the disease, for it has been shown that the disease causes "Stem-end Rot," and that fruit immediately beneath the decaying twigs is peculiarly susceptible to Melanose—fungus spores being produced on the twigs and distributed in water over the fruits, where they give rise to marks consisting of brown, gum-filled cells, forming dots, lines, curves, rings, and irregularly-shaped spots. The streaking on the fruit, which is sometimes referred to as "tear streaking," is produced by the fungus spores in water that drips from some overhanging dead sprig that harbours the fungus. The markings have a wax-like appearance, and vary from yellow to brown or black. Owing to their raised position they produce a roughness that is like sand-paper to the touch. The origin and distribution of the disease in New South Wales appears to be similar to that described in Florida.

The russeting and pear-streaking are often caused by the spores of the wither-tip fungus, *Colletotrichum glæosporioides*, which is very prevalent in New South Wales.

Prune out and burn all dead wood from the trees—small twigs as well as large branches. Spray with Bordeaux mixture or ammoniacal solution of

A Single "Black" Spot. Much magnified.

Showing the minute pustules which contain the spores.



Black Spot of the Orange.

Showing the dark-coloured sunken areas in which are produced minute black pustules containing numberless spores.

FUNGUS AND OTHER DISEASES OF CITRUS TREES.

a *b*

Leaf of Orange attacked by Black Spot.

a Underside of leaf.
b Upper side of leaf.

The spots show a blackened edge with a lighter centre. In some of these minute black pustules are seen.

copper carbonate. At least two thorough sprayings should be made, the first just after the bloom drops, and the second three weeks to one month later.

Maori.

This disease has been attributed to the attacks of a mite, *Eriophyes oleivorus*, but if this mite is ever the cause at all it is certainly very rarely so.

Maori, as the name implies, is suggestive of a reddish-brown colour of the skin, and affected oranges show various degrees of this skin affection. The disease appears to arise from physiological causes, and not from any attack of fungus or mite. The skin of an orange is full of minute oil glands, and in a healthy orange these continually develop as the fruit increases in size. But if any untoward circumstances arise the normal development of the skin is checked, and we get various stages of Maori—from minute reddish dots on limited areas to large brown patches all over the surface—from a small scaly patch to the encasement of the whole orange in a hard, brown, cracked rind. It is noticeable in Maori that the terminal fruits of the oldest and lowest branches are nearly always the first to be affected. This suggests that it may be due to an imperfect flow of sap along the old vessels; certainly judicious but heavy pruning in old orchards frequently results in a marked reduction in the amount of it.

Another important contributing factor is drought, or an intermittent and irregular water supply. Fruit subjected to a long spell of dry weather in the early stages of development will become affected with Maori, and even if rain falls later the recovery is only partial

That best of all means of conserving soil moisture—frequent cultivation of the surface—is the surest remedy against the injurious effects of the soil drying out. Citrus trees are largely surface feeders, and cultivation with the pronged hoe is especially recommended as reducing the injury to the root fibres to a minimum. Perhaps the remark of some growers that "the old-fashioned Maori is seldom seen now" is in itself some indication of the fact that better cultural methods prevail.

"Black Spot" of the Orange.

This disease is produced by a fungus *Phoma citricarpa*. The brown spots, or black spots, appear in the rind of the oranges as small, irregular, sunken patches; later the outermost surface of the patch becomes a light yellow colour, and somewhat dry. Scattered over this, and to be seen with the naked eye, but better with a lens, are minute black pustules—the pycnidia. Later, each of these ruptures, and from the interior emerge hundreds of very minute spores. The disease also occurs on lemons. In an infected orchard the black spots are usually to be found on lemon leaves and twigs, and upon orange leaves and twigs, throughout the year, and it is from these that the disease is most likely distributed. Upon the fruit it does not make its appearance, as a rule, until it is nearly ripe—about the beginning of September. Then, particularly if the fruit is exposed to a hot wind, the black

spots make their appearance, almost suddenly, in the course of a few days, over the exposed surface of the fruit. It is remarkable that the black spots due to this fungus are almost always found developed to the greatest extent on the sunny side of the tree, and especially on the parts of those fruits fully exposed to the sun. Fruit shaded by the foliage, or on the shady side of the tree, is very little affected.

Experiments conducted by the Department in which the trees have been artificially shaded by hessian have resulted in the production of much cleaner crops.

Experiments with spraying with lime-sulphur and with Bordeaux mixture have given very little benefit, but probably systematic spraying of the *whole* orchard for several years and the pruning out of diseased leaves and twigs is necessary before an improvement is to be observed. Fruit infected with Black Spot has a most unsightly appearance, but usually the disease is confined to the rind. If kept for some time, however, the fungal hyphæ in infected fruit extend to the interior. The burning of all fallen diseased fruit is recommended.

"Brown Spot" of the Mandarin.

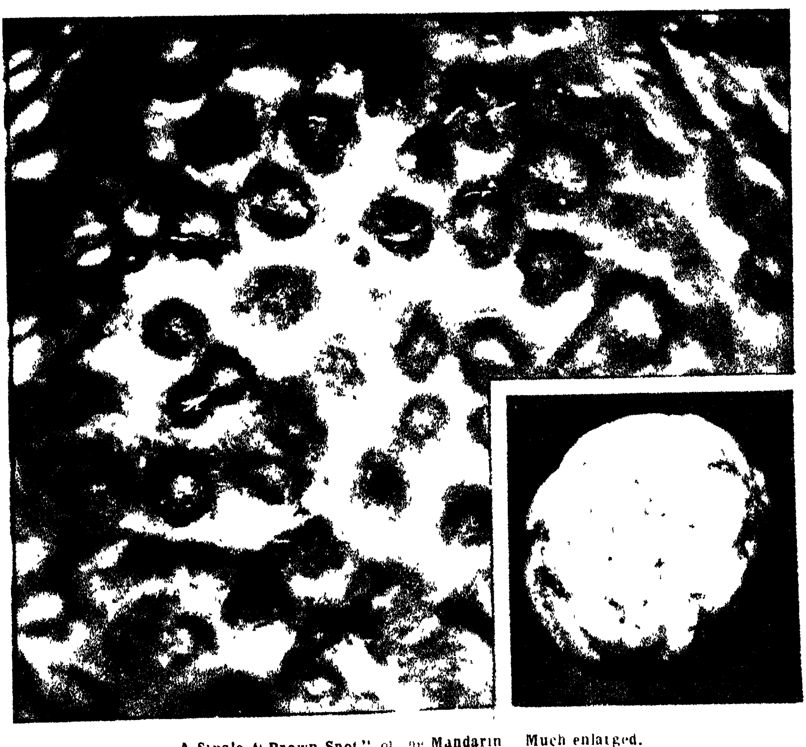
This disease is due to a fungus, *Colletotrichum glœosporioides.* It appears usually as a small brown spot upon the young fruit when about the size of a marble. The spot darkens in colour as the fruit ages. When about half-grown, the affected fruits begin to drop, especially after rain, and very few—even if only one minute spot is present—hang on the tree to ripen. The Emperor mandarin is peculiarly liable to this disease, while the Thorny mandarin is seldom affected, although we have carried out infective experiments in the laboratory. Lime-sulphur solution and Bordeaux mixture have been recommended as remedies, but unless the infected twigs are systematically pruned out these sprays are not of much avail, as the hyphæ of the fungus penetrate deep in the tissues of the twigs, are little affected by the sprays, and produce abundance of spores when favourable conditions arise. Spraying with lime-sulphur solution should be carried out as soon as the fruit has set.

"Brown Spot" of Orange, Mandarin, and Citron.

Upon the young stages of these fruits is frequently to be seen a small somewhat yellowish-coloured spot or spots. The oil-glands appear slightly enlarged, and the yellowish colour is distributed as a reticulated marking between them. The spot may remain like this without further development till the fruit ripens, or the yellowish-coloured spot may become brown, and, at times (depending apparently on the season), they may become brown and sunken, the oil-glands dried up, and occasionally burst and empty. In the orchard no fungus is, as a rule, to be detected upon these brown spots. In the laboratory, however, where we have kept fruit under observation in damp chambers, these spots have developed a number of small black pustules, which later on have burst, and from them have issued a pinkish and whitish exudation containing countless numbers of spores belonging to the genus

"Brown Spot" of Mandarin

Due to the fungus *Colletotrichum gloeosporioides*.



A Single "Brown Spot" of [illegible] Mandarin. Much enlarged.

The inset shows the reticulate markin[illegible] on a young fruit when first infected with "Brown Spot," *Col[illegible]chum gloeosporioides*.

FUNGUS AND OTHER [illegible] OF CITRUS TREES.

of fungus known as *Glœosporium*. We have been surprised at the constant presence and the enormous number of these spores on twigs, leaves, and fruits in the orchard. Apparently the fruit has a certain immunity and a certain power of controlling infection, as evidenced by the small yellowish infective spots on the young fruit which frequently do not develop further. But given the right weather conditions, or the slightest injury to the skin, infection may take place.

We would here emphasise the fact that wonder is to be expressed, not that the fruit becomes infected with fungus disease so often, but that it does not become infected more often, and this has only been brought about by the immunity naturally developed in the skin. Hence, injury to the skin is above all things to be avoided.

Cross infection experiments show that these spores from the Emperor mandarin will infect the apple and, in the laboratory, the Thorny mandarin also.

Bordeaux mixture and lime-sulphur solution prevent the germination of the spores, and, because the spores are so generally prevalent and are produced in such numbers, the regular spraying of the orchard throughout is to be recommended.

We have spoken of the fungus as belonging to the genus *Glœosporium;* sometimes it shows characteristics more usually associated with *Colletotrichum*. Recent work by Shear and Wood in America goes to show that these two genera, formerly separated, should be united into one.

Honey Fungus

Armillaria mellea is one of the largest parasitic fungi found in orange orchards—it is also one of the most insidious. It is a root parasite, and frequently has obtained a firm hold and done much damage before its presence has been even suspected. The foliage of infected trees shows, after a time, a peculiar lack of lustre, and it may eventually wither and die. If the earth be taken away from the bole of the tree and the roots traced out and exposed, there will be found attached to them shining, dark-brown strands which ramify over the surface or mingle with the cortex of the root, or penetrate deeper into the internal tissues. Where the brown strands penetrate into the internal tissues the outer brown covering is usually lost, and a number of very fine white strands only—the mycelium of the fungus—are to be seen. The brown strands are composed of numbers of these white threads running parallel to each other, and as they have this brown covering so that they resemble roots, they are known as *rhizomorphs*. The fine threads penetrate the tissues of the root and rob it of nourishment. The brown strands are usually found on the roots, from a few inches to a foot away from the bole of the tree, but they may often be traced down to a much greater distance. The main roots of the tree are most seriously attacked; they become "ringed" and then rot, and the ascent of nourishment to the stem being thus discontinued the whole tree perishes. At certain seasons this root parasite produces its fructification, usually near the bole of the

tree, in the form of brown "toadstools" that occur in clumps. The following are their chief characters:—The cap or pileus is brown, and somewhat scaly and rough. The cap in the young "button" stage is attached to the fungus stem or stipe, and when it expands it breaks away from the stem, leaving a ring or annulus marking the position of its previous attachment. On the under side of the cap are the gills, which are attached at their inner terminations to the stem and run down it a short distance. The gills, when young, are whitish in colour but the cap and apex of the stem are frequently yellow, hence the name "Honey" fungus. On the under surface of the gills white spores of an elliptical shape are produced in vast numbers. If the whole cap of the toadstool be removed and placed upon a piece of dark-glazed paper, and then lifted after a day or two, a complete outline of the under surface of the cap will be found traced out by the myriads of spores which have become detached from it.

Clearly the destruction by burning of these fructifications or "toadstools," immediately they appear is necessary to prevent the spread of the parasite. But eradication by the destruction of the rhizomorphs is much more difficult. The brown strands wander through the soil and attach themselves to any living roots.

There is no doubt that *Armillaria* lives in the bush upon the roots of bush trees, especially in localities of good rainfall. When this bush is cleared for the planting of a citrus orchard the parasite has no host left in the ground upon which to feed, hence, it at once attacks the young citrus trees when they are planted. It would be good practice to leave freshly cleared bush land for a year or longer before planting a young citrus orchard, in order to starve out this insidious root parasite.

Where a tree shows loss of vigour and a slight change in the colour of the foliage without apparent reason, the earth should be scraped away and the roots examined. If the parasite in the form of brown strands previously mentioned is found upon the roots, all dead roots should be cut out, and all diseased portions should be thoroughly scraped and dressed with strong Bordeaux paste, made as follows:—

> Sulphate of copper, 1½ lb.
> Quicklime, 1 lb.
> Water, 2 gallons.

The paste is applied with a brush. All wounds should be dressed with Stockholm tar, and the bole of the tree and the adjacent roots left exposed to the air for three or four weeks. All diseased roots or portions of roots that have been cut out should be burnt.

Collar Rot.

This disease is due to a minute fungus, *Fusarium limonis*, that attacks the bark just at the surface of the soil—generally extending slightly above and a little distance below it. Generally the first visible intimation of the disease is the fruit setting in abnormal quantity and the foliage turning a sickly yellow colour. A tree that sets an abnormal amount of fruit in any

1 2

Armillaria mellea

1. Root like strands or rhizomorphs running over the surface of a stake that has been driven into the ground.

2. Orange root showing the brown strands running along the bark and breaking their way into the tissue of the root causing its ultimate decay.

Lemon showing rind covered with scab or scurf due to the presence of a fungus *Cladosporium* sp.

FUNGUS AND OTHER DISEASES OF CITRUS TREES

one season is always to be regarded with suspicion, and should be especially examined for the presence of some disease. The bark frequently becomes "gummy," and has a faint smell. Later the bark becomes brown and rotten, and the danger is that it may become entirely ringed, and the normal flow of sap interfered with. The rot may extend inwards from the bark for a considerable distance.

Remove the soil around the bole of the tree, and treat as for *Armillaria.* Manure the tree to stimulate growth.

"Scabbing" of Fruit.

Several microscopic fungi are associated with the production of warty swellings or scabs on fruit. The fungi mostly belong to the genus *Cladosporium.* "Scabbing," or verrucosis, is especially found upon lemons, and is worse in moist than in dry climates. It is found on even very young lemons as a series of light-yellow warty incrustations, and often on older fruits the whole skin is covered.

Remove and burn all affected fruits. Spray all trees with Bordeaux mixture or ammoniacal copper carbonate several times during the year. If the spraying is to be done approaching the time of marketing the fruit the carbonate of copper wash is preferable to the Bordeaux, as it causes less marking.

"Wither-tip" and "Die-back."

A variety of fungi are associated with these symptoms, the most common being species of *Phoma* and *Colletotrichum.* Usually the diseased twigs start to wither at the apex and gradually die back, the leaves also being affected. Diseased leaves generally show whitish-grey, blister-like patches, which frequently coalesce. Diseased twigs usually show small black dot-like pustules, more or less embedded in their substance. Each of these minute pustules, or pycnidia, contain innumerable very minute colourless spores, by which the disease is for the most part disseminated.

Cut out the diseased twigs and burn them. Then spray with lime-sulphur solution. "Wither-tip" has been especially associated with excess of ammonia compounds in the soil and poor nitrifying power of the soil. Thorough cultivation and the avoidance of incompletely decayed organic manures is in this case the remedy.

Exanthema.

This disease is of physiological origin. The leaves of the trees are usually of a dark-green colour, but the young shoots turn yellow, and the leaves fall. The twigs turn reddish-brown and die back. The bark of the older branches often becomes blistered, split, or ruptured. From the ruptures a hard, dark-coloured, resin-like gum exudes, which later granulates. The ruptures do not usually extend into the sapwood or cambium. In some cases the fruit falls early; in others it becomes hard and insipid. Conditions favouring the disease are:—(1) Light sandy soil; (2) continued drought, followed by heavy rain; (3) lack of organic matter.

The remedy is the adoption of methods that will increase the amount of humus in the soil.

Chloresis.

In some orchards trees occur showing white spots or blotches in the leaves; this condition is known as chlorosis. It may be due to several causes, and the remedy will depend upon the particular factors which are operating. The chief causes are excess of lime, the continuance of drought, and the absence of iron. Chlorosis due to the absence of iron is seldom found, and is remedied by the application of a small quantity of sulphate of iron to the soil. Droughty conditions are only to be overcome by the introduction of an irrigating plant. For excess of lime in the soil, no remedy can be profitably employed.

Fumigation of Fruit and Plants with Hydrocyanic Acid Gas, and Dipping or Fumigating Cases, Bags, and Crates.

The following are the amended regulations which were gazetted on 16th October, 1914. –

1. Fruit and plants will be received at the Government Fumigating Chamber, Day-street, Sydney, from 7 a.m. to 3 p.m. daily from Monday to Friday inclusive, and on Saturdays from 7 a.m. to 10 a.m.

2. The fruit or plants shall be allowed to remain in the chamber for at least one hour after closing and charging, and no one shall be allowed to enter the chamber until the gas has been drawn away.

3. Fruit for fumigation must be entirely free from wrapping, and shall be packed in cases of the sizes specified in the Regulations under the Fruit Cases Act, 1912, if for sale or export to the other States of the Commonwealth. If any such fruit be packed in gin cases, the lids of same shall be opened if necessary by the consignor, before placing in the chamber. No paper will be allowed in the cases. Parcels containing plants must be opened down to the roots, and the unpacking and repacking of same must be done by the consignor.

4. Fruit and plants for fumigation will be received only in packages, bundles, or cases which are constructed in such a way as to permit the free circulation of gas throughout.

5. Fruit and plants must be removed from the fumigating chambers within one hour of completion of fumigation, otherwise they will be removed and stored by the Department at the cost of the consignor.

6. The consignor must furnish with each load of fruit or plants, on a form provided for the purpose, particulars as to the name of the consignee, shipping brands, number of cases or packages, the variety of fruit, the port or place to which the fruit or plants are consigned, and the name of the ship or other means of transit by which such fruit or plants are to be forwarded.

7. The Department will not be responsible for any damage to, or loss of fruit or plants delivered for fumigation, resulting from any cause beyond the ordinary control of its officers.

8. The following fees shall be payable, with a minimum charge of three pence, for fumigating and dipping :—

Fumigation.

Fruit.—Per case of not more than one bushel	One penny.
,, ,, more than one bushel	Two pence.
Plants.—Per square foot or part thereof of floor space occupied by the packages containing the plants ...	Three pence.

Dipping or Fumigating.

Second-hand cases	One penny each.
,, bags	One half-penny each.
,, crates	Sixpence each.

9. All fees charged in accordance with the foregoing regulation must be paid in advance to an authorised officer of the Department of Agriculture.

Sheep on the Wheat Farm.

H. ROSS, Chief Inspector of Agriculture.

ONE of the most important developments of wheat-growing in New South Wales during the past few years has been the recognition by many of the most up-to-date farmers, that sheep are a valuable adjunct to the business. The combination of wool and mutton raising with wheat is not new, of course, successful growers having long practised it; but the number of those who recognise that maximum profits in wheat production cannot be earned without the aid of sheep has greatly increased within the last decade, and it may now be said that sheep are found to be an absolute necessity in conjunction with wheat-growing.

Sheep have so many uses on the farm, and are so easy to keep, that a few moments' consideration will indicate to any farmer how profitable they may be. For keeping the fallows clean, feeding off crops that are growing too rank, making some use of stubble land between harvesting and ploughing, or controlling and killing out wild oats, sheep are the easiest and most economical agents that can be employed, their deposits the while helping to fertilise the land and adding that to the soil which cannot be supplied artificially--viz., humus.

When, years ago, the subdivision of the big estates into small farms was commenced, it was anticipated by many that the numbers of our sheep would diminish in consequence, but the forecasts of numerous prophets have been falsified, and it has been found that the country that formerly carried 1,000 sheep is frequently now in a position to carry the same number of sheep though 400 to 500 acres are cultivated for grain No hard-and fast rule can be laid down as to the number of sheep a wheat farmer can carry, for much depends on the season and upon the proportion of the farm usually under crop, but it might be stated, as a general indication, that any farmer with 600 acres can safely stock from 300 to 400 sheep.

The Value of Fodder Crops.

It should be understood that by the word "safely" is not meant a sole reliance on the natural pastures on the farm, or even on those together with the feed provided by the fallows or the stubbles. Like most farm animals, sheep pay best when a little attention is given in the way of growing fodder for them. It is not suggested, of course, that men with large holdings of, say, 30,000 to 40,000 acres should endeavour to grow crops for sheep feed; it is the farmer with an average area of 500 to 1,000 acres who will find the practice of the greatest value to him. The nature of the crop will depend largely on the district in which the farm is situated. Where the rainfall is chiefly a summer one, such as in the North-west, it is advisable to grow

a certain amount of summer fodder, whereas in the Southern portion of the State (the Riverina, South-western, and Central-western Slopes, and the Central Tablelands), where the rainfall in the summer is light, farmers will have to depend more upon crops which can be sown in the autumn.

In the first-named portion—the North and North-west—crops, such as cowpeas, soy beans, sorghum, and maize, can be grown with some advantage, but even there it is during the late autumn and early winter that fodder crops are most required, and the summer ones must always be of less importance.

Rape on the Wheat Farm.

The area of winter rainfall includes much the larger part of the wheat lands of New South Wales, and as rape is specially suitable for the conditions there obtaining, it is at once the most important rotation crop in conjunction with wheat, and the most useful fodder crop for sheep. So useful is rape, indeed, that no matter in what part of the State the wheat farm is situated it can be sown, but in order to get the best results it must always be sown toward the end of February, so that advantage may be obtained from the early autumn rains, and that it may be ready to be fed off in May and June—a time when, lambing being just over, the ewes are in need of succulent green feed to maintain the milk flow.

In mentioning rape as of value in rotation with wheat, it is not suggested that 300 acres of rape should be sown where 300 acres of wheat has just been harvested. What is suggested is that every farmer who combines sheep and wheat will find a small area of 30 to 50 acres of rape a first-class investment, for by means of it he will ensure succulent feed at the very time when herbage is scarce and the ewes have their lambs at foot.

Generally speaking, rape should be sown on the stubble, a ploughing of 4 or 5 inches, or a thorough good discing with the one-way disc cultivator, being given as soon as possible after harvest, before the land can set hard. The ploughed land should be well worked over with the cultivator or harrow to get a fine seed-bed, and seeding should be over by the end of February. In the hottest districts it can be delayed a few days longer, the Manager of Nyngan Demonstration Farm having obtained good results from early March sowings.

The method of sowing recommended is to mix 4 lb. of rape seed and 60 lb. of superphosphate together, and to sow through the manure box of the drill. The quantity mentioned will sow an acre, and it is unwise to put more than 64 lb. of the mixture into the box at one time, as in a large quantity the vibration is almost sure to bring most of the seed to the surface. For this same reason it will be found that a more even sowing is obtained if the hand is run through the mixture fairly frequently, in order to keep the seed and the fertiliser well mixed.

It is not advisable to set the hoes or discs in too deeply, but to put them in the first notch. With some drills even this will give a deeper sowing than is required, which is ¾ inch to 1 inch. Should it not be possible to set the hoes so as to sow so lightly, it is better to take the tubes out of the hoes

altogether and let them hang alongside, allowing the seed and manure to be broadcasted, but a light harrowing will then be necessary to cover the seed.

One of the advantages of rape is that it is inexpensive to put in, and requires no after cultivation. At Nyngan Farm, the Manager estimates the cost at 8s. to 9s. per acre, but there both the seeding and the fertilising are light. At Bathurst Experiment Farm, it approximates 10s. 6d. to 12s. 6d. per acre.

Dwarf Essex is the variety that has given the most satisfactory results in New South Wales. It will be found that it will provide valuable and timely feed for the end of May or beginning of June.

Complaints are sometimes made by farmers that rape has caused "hoven" in sheep, and this certainly has occurred where ordinary precautions have not been taken. Rape was never intended as a crop on which to turn out mobs of "starvers," for they naturally eat too much and thus become "blown. But that is a limitation that does not apply to rape alone; any succulent crop will produce the same condition in any starving animal—sheep or cattle. It is also inadvisable to turn sheep on to rape that is wet with rain or dew, if for no other reason than that the fodder is then trodden into the wet soil and a large percentage lost, while the ground itself is thrown out of condition.

Apart from the benefits accruing to the sheep themselves from a green crop, sight must not be lost of the effect upon the soil, which will last for several years. The residues, when ploughed in, provide the humus that is so essential to continuous fertility, and in their droppings the sheep return some 70 per cent. of what they have consumed.

The wheat farmer who sows, say, 10 per cent of his total cultivable area with crops to be used as fodder for his sheep, will in a few years have had the whole of his wheat land under a crop that will maintain the soil in that state of permanent fertility that can only be obtained with a rotation, but can never be hoped for where wheat is grown continuously.

We have received a request for copies of Part 6 of Volume 20 (June, 1909), and Parts 1, 4, and 10 of Volume 22 (January, April, and October, 1911), for binding purposes. Should any of our readers have copies of these issues to spare, we would be glad to receive them for the purpose mentioned.

An Emergency Food for Farm Horses.

A Recommendation to Wheat Farmers.

A. H. E. McDONALD, Manager, Coonamble Experiment Farm.

Owing to the poor growth of crops many farmers will find themselves hard pressed for feed for their horses during the coming planting season.

Short commons in chaff will prevail on many farms, and as the price, if supplies have to be purchased, will be almost prohibitive, a curtailment of areas may occur through this cause.

Under the circumstances it is well worth trying to find some substitute for the usual supplies of chaff.

Sorghum is such a crop, and now is the season to plant it. A few farmers have tried it in the past, and have found it excellent feed for working horses. The stems are fine and can be easily cut with the mower or reaper and binder, and it can also be chaffed if necessary. Where a small amount of chaff is available the horses can be kept in good condition by giving them chaff for the midday meal and Sorghum at night. They become very fond of the Sorghum, as it contains large quantities of sugar, and will waste very little even if it is not chaffed.

The best varieties are Early Amber Cane and Sorghum Saccharatum. If these cannot be obtained Planter's Friend may be sown. The land should be worked up into a fairly fine condition. On some of the wheat paddocks where a failure has occurred the cultivator will probably produce the necessary tilth, if not the plough should be used.

Sowing may be done with the wheat drill. The seed is fine and runs easily, therefore the wheat side should be used. It should be sown in rows about 3 feet apart, and to do this some of the tubes should be closed. About 4 or 5 lb. of seed per acre are required. It should be covered about 2 or 3 inches. After the plants have appeared and are well rooted, harrowing or cultivating will help to conserve moisture, and thus increase the yield.

Sorghums are very hardy, and once the plants are above the surface they will wait long periods for rain. The yield varies from 6 to 12 tons of green-stuff per acre.

The crop has the advantage that it retains its sap and feeding qualities long after it has become frosted.

Farmers can therefore be heartily recommended to put in an area of this excellent crop in such a season as the present, and, with a fair rainfall, a profitable bulk of fodder is assured.

Cost as a Factor in Wheat Production.

H. ROSS, Chief Inspector of Agriculture.

THE question of the cost of producing a crop of wheat has always been of supreme importance to the wheat grower, but perhaps never in the history of New South Wales has it been of greater interest than now. Discussion has been frequent and prolonged, the result being the disclosure of greater diversity of opinion than about almost any subject touching farm practice. Individual variations in methods of farm management and work are so great that, while hundreds of farmers can agree about the quantity of seed or manure that should be used per acre, or about the preparation of the land, few can agree as to the actual cost of production. The estimates presented in this article have been prepared from figures furnished by the managers of various experiment farms in the State, and by the inspectors stationed in the wheat belt, who in their turn obtained much valuable information from the leading growers in their respective districts. Even in figures so carefully collected as these, some variations have been disclosed, but they are not sufficiently large to seriously affect the issue, and it is possible to present the estimates in this article as approximating the average costs for the wheat belt of the State.

Wheat for Grain.

In the following estimate of the cost of growing wheat for grain, it is assumed that the land is fallowed, and the items for harrowing and cultivating are therefore greater than in the case of land that is ploughed, worked, and sown in one season.

The item "rent" will vary with the value of the land, but for convenience the capital value is assumed to be £6 per acre, and two years' rent at 5 per cent. has to be debited against the crop. It should not be understood, however, that the farmer can make nothing out of the land while it is under stubble or after it has been ploughed for the fallow. As pointed out in another article in this issue, profitable pickings are available for sheep on such cultivation land at different times in the year, but, as the present concern is the cost of producing a crop of wheat for grain, that aspect of the subject may be set aside, and the rent for the whole of the two years must then be charged against the grain crop. In the case of unfallowed land, of course only one year's rent would be included.

Cartage to the railway is another item that is hard to estimate, as very much depends on the distance and the nature of the country, but 1s. per ton per mile may be taken as a basis, and for an average distance of six or seven miles this works out at very close to $2\frac{1}{4}$d. per bushel.

COST of producing an acre of wheat for grain. Estimated yield, 20 bushels.

	£	s.	d.
Ploughing once	0	6	0
Harrowing, three times at 9d.	0	2	3
Disc-cultivating once...	0	2	6
Spring-tooth cultivating once	0	1	9
Drilling	0	1	6
Seed, 45 lb. at 5s. per bushel	0	3	9
Superphosphate, ½ cwt. at 5s. per cwt.	0	2	6
Pickling seed	0	0	3
Harvesting with harvester	0	3	0
Bags, seven per acre at 6s. per doz.	0	3	6
Total cost of growing and harvesting	£1	7	0
Rent, two years at 6s. per annum	0	12	0
Cartage to rail, at 2¼d. per bushel	0	3	9
	£2	2	9

Wheat for Hay and Chaff.

Whether it is more profitable in an average season to harvest for grain or for hay, is ever an interesting subject for discussion. In the main, of course, everything depends on the market prices of the two lines, but the respective costs of growing, harvesting and carting are also important, and it may therefore be of interest to consider the average outlay per acre of cutting with the reaper and binder and subsequently chaffing.

As the preceding estimate is on the basis of a yield of 20 bushels of grain, it is convenient to assume that the equivalent yield in hay will be 2 tons.

The estimate is again framed on the assumption that the land is fallowed, and rent for two years is added as before.

Taking 1s. per ton per mile as the basis of the item "cartage to rail," the cost for a distance of, say, 6 miles can be set down at 6s. per ton

COST of producing an acre of wheat for chaff. Estimated yield, 2 tons

	£	s.	d.
Ploughing once	0	6	0
Harrowing, three times at 9d.	0	2	3
Disc-cultivating once...	0	2	6
Spring-tooth cultivating once	0	1	9
Drilling	0	1	6
Seed, 45 lb. at 5s. per bushel	0	3	9
Superphosphate, ½ cwt. at 5s. per cwt.	0	2	6
Pickling seed	0	0	3
Cutting with binder	0	3	6
Twine	0	2	0
Stooking	0	1	0
Carting, stacking, and thatching	0	6	0
Cutting for chaff, 2 tons at 10s. per ton	1	0	0
Bags, say 24 per ton, at 5s. 6d. per dozen	1	2	0
Total cost of growing, harvesting, and chaffing ...	£3	15	0
Rent, two years at 6s. per annum	0	12	0
Cartage to rail, at 6s. per ton	0	12	0
Total	£4	19	0

It will be observed that the figures throughout are on a fairly high scale. For instance, 6s. per acre is allowed for ploughing, whereas the work can be done by contract at 4s. 6d. to 5s. Regular farm hands employed on weekly wages would also effect a saving. Depreciation is included in the rates for the different operations.

Cost of Production in New England.

The above estimates apply to districts such as the Riverina, the Slopes, and the West and North-west, but there are districts, such as New England, where farm operations are conducted on a different scale, principally owing to the different methods of cultivation and harvesting, necessitated by soil and climatic conditions.

The Manager of Glen Innes Experiment Farm provides the accompanying estimate which may be quoted as applying to a fairly extensive area. It will be observed that the cost of production is very much higher than in the foregoing groups of figures. Ploughing is valued at 10s. 3d. per acre, as against 6s. in the regular wheat districts, the reason being that in the Riverina three and four-furrow ploughs are employed, whereas on the Tableland the work is done with single and double-furrow implements. The areas are also much smaller.

It is not the practice in New England to fallow the land for grain, and rent must consequently be charged for one year only. The general valuation of £6 per acre may be accepted as a basis for calculating the rent. Nor is there any essential difference in the cost of carting to rail.

COST of producing an acre of wheat for grain in New England. Estimated yield, 20 bushels.

	£	s.	d.
Ploughing once ...	0	10	3
Harrowing, twice at 1s. per acre ...	0	2	0
Cultivating once ...	0	2	6
Drilling ...	0	1	8
Seed, 60 lb. per acre at 5s. per bushel ...	0	5	0
Superphosphate, ½ cwt. at 5s. per cwt. ...	0	2	6
Pickling seed, at 3d. per acre ...	0	0	3
Cutting with binder ...	0	5	0
Twine, 5 lb. per acre, at 6d....	0	2	6
Stooking for grain ...	0	1	6
Carting and stacking ...	0	9	0
7 bags at 6s. per doz. ...	0	3	6
Thrashing at 1s. 6d. per bag ...	0	10	6
Total cost of growing and harvesting ...	£2	16	2
Rent, one year ...	0	6	0
Cartage to rail, at 2¼d. per bushel ...	0	3	9
Total ...	£3	5	11

In addition to the return from the sale of grain the value of the straw from the 20 bushel crop has to be considered. On most farms this is worth at least £1 per ton, and thus from 12s. to 16s. would act as a set-off to the extra cost of cutting with the reaper and binder.

Cost of producing an acre of wheat for chaff in New England. Estimated yield, 2 tons.

	£	s.	d.
Ploughing once	0	10	3
Harrowing twice	0	2	0
Cultivating once	0	2	6
Drilling	0	1	8
Seed, 75 lb. at 5s. per bushel	0	6	3
Superphosphate, ½ cwt at 5s. per cwt.	0	2	6
Pickling seed, at 3d per acre	0	0	3
Twine	0	2	6
Cutting with binder	0	5	0
Stooking for hay	0	2	6
Carting and stacking	0	9	0
Cutting for chaff, 2 tons at 10s.	1	0	0
Bags, 2 doz per ton at 5s. 6d. per doz	1	2	0
Total cost of growing, harvesting, and chaffing .	£4	8	5
Rent, one year .. .	0	6	0
Cartage to rail at 6s. per ton . . .	0	12	0
Total	£5	6	5

It is evident from a perusal of the statements submitted that the cost of producing either a bushel of wheat or a ton of hay will vary considerably in different parts of the State. In the principal wheat-growing areas, however, the costs are practically uniform when all other conditions apart from actual climate, are approximately equal. It is only in districts where a totally different system of preparing the land and harvesting the crop is in vogue that any material discrepancy occurs.

With regard to chaff, it is obvious that in such a district as Glen Innes the production of chaff must necessarily be limited to the requirements of a more or less restricted local area, except in seasons of a general shortage.

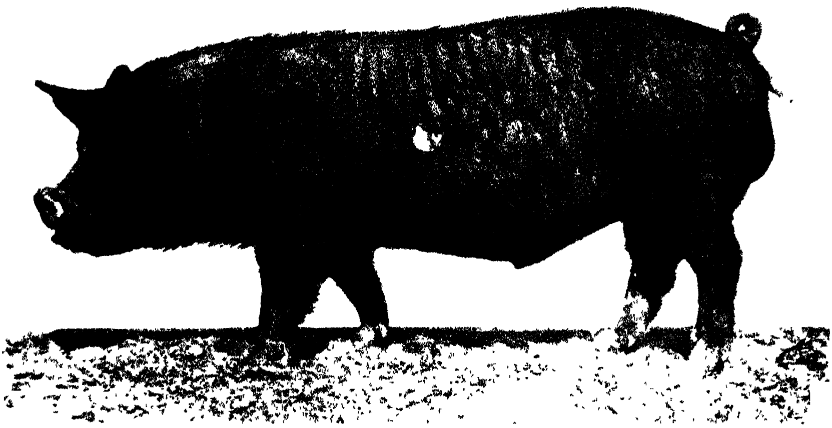


Fig. 1. Berkshire Boar, Velomore (imp.).

No. 763, Berkshire and Yorkshire Herd Book of Australasia.

Fig. 2. Berkshire Boar, Mountain Lad.

No. 298, Berkshire and Yorkshire Herd Book of Australasia.

First, Champion, Special, and Herd Boar Ribbon, Melbourne Royal Show, 191

First, Champion, Special and Herd Boar Ribbon, Sydney Royal Show, 1914.

HAWKESBURY AGRICULTURAL COLLEGE STUD.

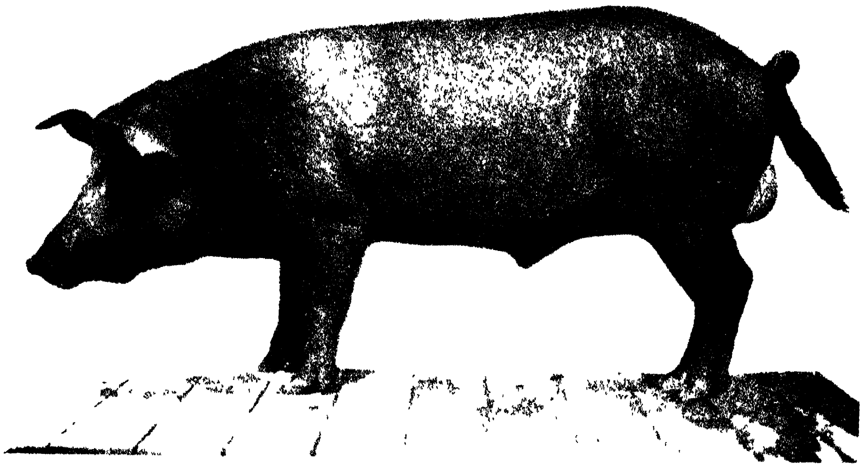


Fig. 3. Tamworth Boar, Brokenhurst (imp.).

No. 31, Berkshire and Yorkshire Herd Book of Australasia.

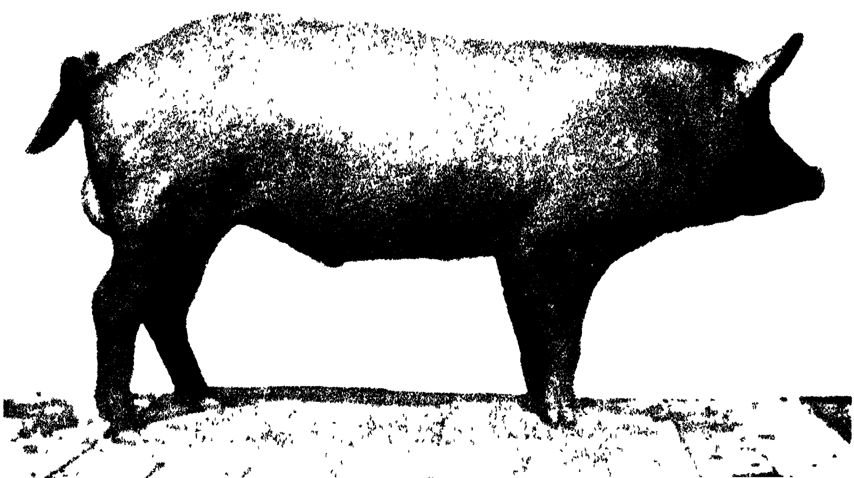


Fig. 4. Tamworth Boar, Knowle Macqueen III (imp.). N.B. 18,247.

No. 32, Berkshire and Yorkshire Herd Book of Australasia.

HAWKESBURY AGRICULTURAL COLLEGE STUD.

Recent Importations of Stud Pigs for Hawkesbury Agricultural College.

Berkshires, Tamworths, and Poland Chinas.

E. J. SHELTON, Pig and Bacon Expert.

In order to keep pace with the increased demand for all classes of stud pigs, the Department of Agriculture has imported several of the best type for the Hawkesbury Agricultural College stud, and these, together with the large number of imported and locally bred animals already in the stud, will assist in maintaining the reputation of the College piggery at its present high standard.

The breeds kept are—Berkshire, Tamworth, Large and Middle York shire, Poland China, and British Large Black, and the importation of July last, referred to above, consisted of—one Berkshire boar, two Tamworth boars, three Tamworth sows, and two Poland China boars.

Berkshires.

Berkshire boar, Vetomore (imp.), No. 763, Berkshire and Yorkshire Stud Book of Australasia.

This animal represents the very latest type of Improved Berkshire, and was selected in order to mate with the types imported in 1912. The popular types of Berkshire nowadays carries more length and a greater depth than that of former years, and this has necessarily given an increase in the length of body, snout, &c. The very short, chubby, pug-nosed types are going out of favour.

The boar just imported was bred at Southampton, England, by Mr. Alfred Brown, at his Hill Farm.

Sire, the noted boar Veto Bill (B B No 15,796), by Highmore Viscount (B B. No. 12,721); by Highmore Mikado (B B. No 10,435). Vetomore's dam is also a well-known prize-winner. Velmore Matchless I (B B No 15,113); from Matchless B. (B.B. No. 14,015); from Whitley Matchless (B B No 11,720).

Mr. Brown's stud has been for long recognised as one of the leading Berkshire herds in England. The Velmore strain of Berkshires has come into favour in England recently on account of its quick growth and early maturity, combined with strong constitution.

The imported boar was farrowed in November, 1913, and will be put to the stud as soon as he is old enough. His pedigree has been certified to by the Editing Committee of the British Berkshire Society.

While referring to Berkshires, mention might be made of a recent addition to the College stud by the purchase of the Champion Berkshire boar Mountain Lad, which was purchased at the Royal Agricultural Show, 1914.

Mountain Lad (No. 298, Berkshire and Yorkshire Stud Book of Australasia) is a splendid massive boar, and was bred by Messrs. O'Shannassy Bros., of Leongatha, Victoria, and later owned by Mr. T. K. Adkins, of "The Block," Korumburra, Victoria. He has the following excellent Show record to his credit :--

First and Champion Berkshire Boar.—Leongatha Show, 1912
" " " Korumburra Show, 1913.
First, Champion, Special, and Herd Book Ribbon—Melbourne Royal Show, 1913.
First and Champion—Korumburra, 1914.
First, Champion, Special, and Herd Book Ribbon—Royal Agricultural Show, Sydney, 1914.

He was farrowed on 16th August, 1911, and took his first prize at the age of seven months. His pedigree is as follows:—

Sire, Spencer (510, B.H.B.), from Queenie II (511, B.H.B.), by Maori Boy; g dam Queenie, by Young Scott; g g dam Princess S., by Outlaw. Spencer (510, B.H.B.), sired by John Peel (95, B.H.B.); dam May Flower. John Peel (95, B.H.B.), by Peel Joe (B.B. 10,528).

Tamworths.

The importation consists of the boars Brokenhurst (No. 31, vol. 5, Berkshire and Yorkshire Herd Book of Australasia) and Knowle Macqueen III (N.B. 18,247 and No. 32, vol. v, B. & Y. H.B. of Australasia), and the sows Hereford Queen (No. 22, vol. v, B. & Y. H.B.), Salisbury Queen (No. 21, B. & Y. H.B.), and Royal Ruby (N.B. 40,358 and No. 33, B. & Y. H.B.).

Though, as was to be expected, all these pigs suffered as a result of the change of climate, &c., and looked somewhat rough on arrival, they have all acclimatised well and are now showing splendid growth of hair, and have improved considerably in condition.

The Tamworth, being a direct descendent of the wild hog of the Midland counties of England, does not stand handling and shipping as well as the Berkshire or Poland China. Its natural habit is to graze and to forage for itself in the open.

This is a distinct advantage in the more genial climate of New South Wales, where the paddock system of feeding is so profitable; and if crossed with Berkshire or Poland China types, the very best results are obtained.

The recent arrivals are a decided improvement on the types of some years back. There is a vast change for the better in the skin and hair; much of the one-time coarseness has now disappeared—the coat is a golden-tinted red, the skin soft and mellow, the flesh firm in texture, snout shorter, head more compact, and the bone much finer throughout. The sides are very deep, whilst the ham has thickened and the meat is carried lower on to the hock.

The body is more compact, with a greater width across the loins and back, and the aptitude to lay on flesh has increased.

Brokenhurst (imp.) (No. 31, B. & Y. H.B.) is the larger boar. He was farrowed 10th July, 1913.

Sired by Dick of Ormaston (N.B. 13,143), by Rufus of Ormaston (N.B. 11,435), by Knowle Surprise (N.B. 10,439). His dam, Brokenhurst Megellic (N.B. 34,446), was

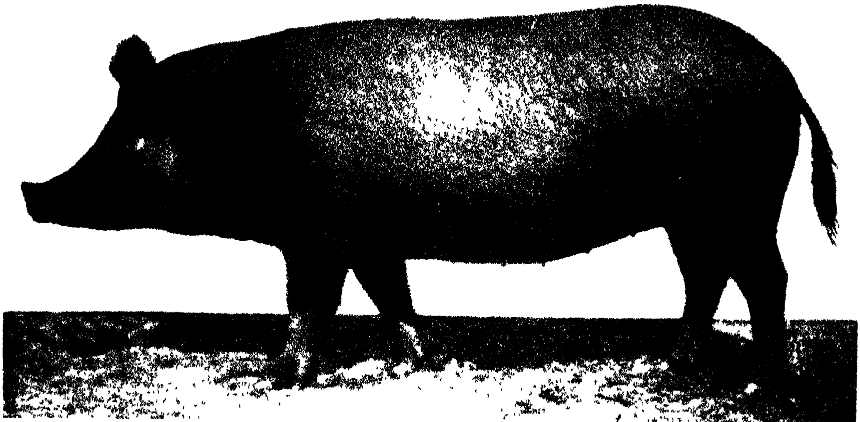


Fig. 5. Tamworth Sow, Salisbury Queen (imp.) No. [illegible] and [illegible] H.B.A.

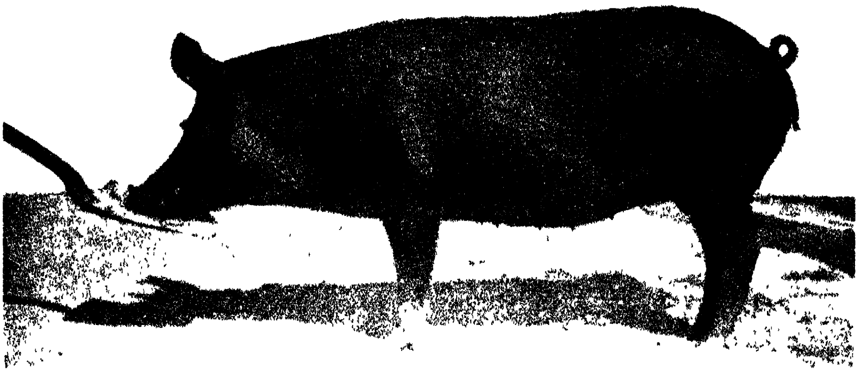


Fig. 6. Tamworth Sow, Hereford Queen (imp.) [illegible] H.B.A.

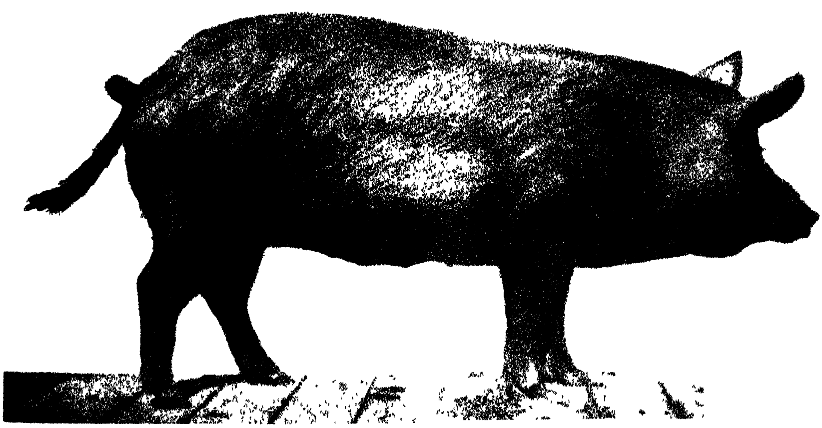


Fig. 7. Tamworth Sow, Royal Ruby (imp.) [illegible] 40,[illegible] No. 23 [illegible] H.B.A.

HAWKESBURY AGRICULTURAL COLLEGE STUD.

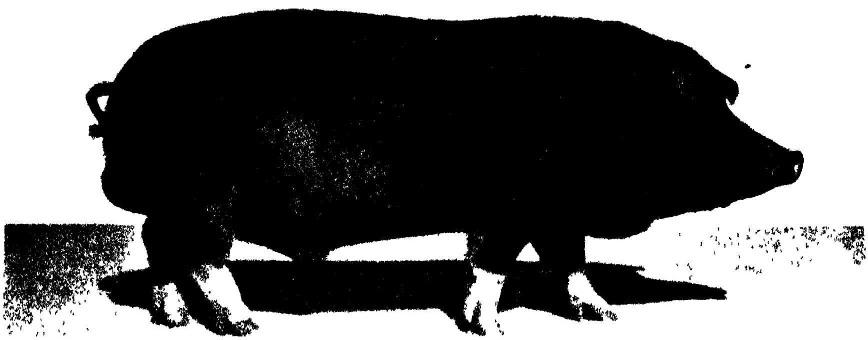


Fig. 8. Poland China Boar (imp.).

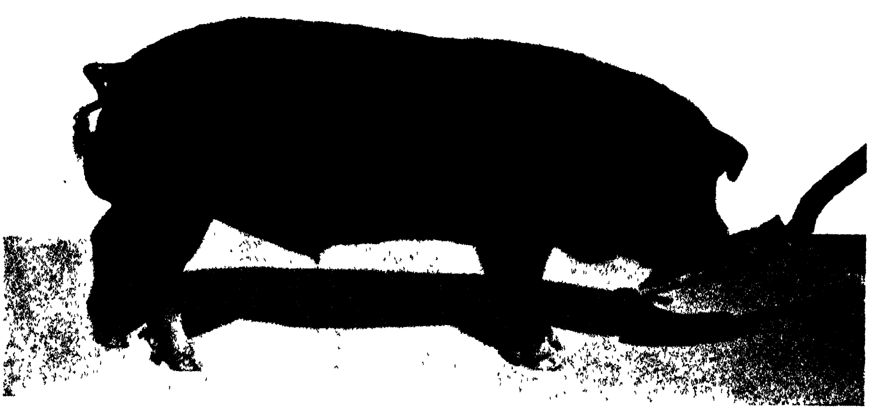


Fig. 9. Poland China Boar (imp.).

Both of these were selected by the Chief of the Bureau of Animal Industry Department of Agriculture, Washington, U.S.A.

HAWKESBURY AGRICULTURAL COLLEGE STUD.

sired by Forester of Dilton (N.B. 13,179), by Bishop of Knowle (N.B. 11,337). The dam of Brokenhurst Megellie was Dilton Megellie (N.B. 31,128), from Megellie of Dilton (N.B. 22,270).

The younger boar, Knowle Macqueen III, is already entered in the National Herd Book of England (No. 18,247), and is now entered in Herd Book (vol. v) of the Berkshire and Yorkshire Society of Australasia (No. 32).

He was sired by Warwickshire (N.B. 18,297), by Apricotina (N.B 14,529), by Knowle Cranmer (N.B. 13,195). His dam, Kathleen (N.B. 34,556), was sired by Dick of Ormaston (N.B. 13,143) and from Aster of Ormaston (N.B. 27,216). The latter sow was by Redskin of Whitacre (N.B. 12,219), from Whitacre Countess XI (N.B. 22,324).

Both boars come from the herd of that celebrated breeder, Mr. Robert Ibbotson, of Knowle, Warwickshire, England, and both pedigrees have been certified to by the Editing Committee of the National Pig Breeders' Association of England.

Of the sows Salisbury Queen (No 21, B. and Y. H.B.) appears to be the best. She shows splendid quality, and has developed very well.

She was sired by a noted boar, Peer's Choice (N.B. 16,953), by Knowle Sylvanus (N.B. 14,617), by Knowle Lord Minto (N.B. 12,191). Her dam was the well-known Cholderton Golden Jewel (N.B. 24,282): sired by Rolleston Victor (N.B. 8,357), by Rolleston Roamer (N.B. 7,505). Her dam, Cholderton Favourite V (N.B. 12,062), was from Whitacre Favourite (N.B. 7,830).

Hereford Queen (No. 22, B. and Y. H.B.), introduces the Webton strain, which is quite new to our stud.

Her sire is one of the most successful animals of that type, and is called Bishop of Webton (N.B. 15,741); by Elford Bishop (N.B. 13,175); by Bishop of Knowle (N.B. 11,337). The dam, Cherry of Webton (N.B. 34,478), was from Knowle Clara (N.B. 31,152), from Constance (N.B. 22,166).

Royal Ruby (N.B. 4,035 and No. 23, B. and Y. H.B.) was sired by Knowle Antonio (N.B. 16,911), her dam being Royal of Bearley (N.B. 37,112).

All three sows were farrowed in June, 1913, and since arrival have been stinted to imported boars. Their progeny, when available, should be even better than the sows themselves, as they will be acclimatised, and, therefore, better able to adapt themselves to our conditions.

As with the boars, the pedigrees of the sows have been duly certified to by the Editing Committee of the National Pig Breeders' Association of England, and all three come from the herd of Mr. Robert Ibbotson, the breeder of both the boars.

Poland Chinas.

The two boars were imported from the United States, and arrived in Sydney by s.s. "Marama," from Vancouver, on July 6th last, and after undergoing the usual quarantine, were transferred to the College.

The larger boar (unnamed yet), represents the latest type of Poland China, and is undoubtedly the finest Poland China boar we have ever imported. He is a distinct acquisition to the stud in this breed, for he shows great length, depth, compactness, and quality, and should easily uphold the reputation this breed has already gained for quick growth and early maturity.

The best results from the farmer's standpoint are obtained by using sows of this breed with either Tamworth, Berkshire, or Middle Yorkshire boars.

The younger boar (also unnamed), has already developed at a remarkable rate, and should fill out into an excellent sire as he grows older.

Both boars have acclimatised well, and the former has already gone to the stud. They were both selected by the Chief of the Bureau of Animal Industry, Department of Agriculture, Washington, U.S.A.

Vine and Vegetation Diseases and Fruit Pests Act, 1914.

The following are included in the amended regulations which were gazetted on the 13th October, 1914.

Treatment.

(*a*) All apple, pear, and quince trees, and suckers shall be sprayed effectively not less than three times with an approved brand of arsenate of lead in the proportion of not less than eighteen (18) ounces of dry arsenate of lead powder or its equivalent of arsenate of lead paste to each fifty (50) gallons of water, or with such other substance or mixture as the Minister may direct in the *Government Gazette*, Such spraying shall be carried out in the following manner, that is to say, the first spraying shall be completed within five (5) days after the petals have fallen from the flower. The second spraying shall not be begun before four (4) weeks after the petals have fallen from the flower, but shall be completed within six (6) weeks after such petals have fallen from the flower. The third spraying shall not be begun within nine (9) weeks after the petals have fallen from the flower, but shall be completed within ten (10) weeks after such petals have fallen from the flower.

Provided that, if in the opinion of an inspector, the spraying has not been effectively carried out, or if he deems another spraying necessary, the Minister may require the occupier or owner to apply a fourth application in a manner to be directed.

(*b*) All apple, pear, and quince trees shall be kept clear of dead bark and broken limbs, and all cavities or crevices which may prove shelters for codlin moth shall be cleaned out effectively. If any supports or other materials or objects attached to or used in connection with any such trees are likely to convey any fruit pest, such supports or other materials shall be removed and destroyed.

(*c*) Fruit cases or other packages in which infected fruit or plants have been packed, or which are deemed likely to convey fruit pests, shall be either treated by immersion in boiling water for two minutes or destroyed by burning.

In order that orchardists may be enabled to utilise many of the various brands of arsenate of lead at present on the market, the following table has been compiled by the Chemists' Branch, to whom samples have been submitted for analysis.

Table showing weight of various brands of lead arsenate paste to be taken in order that the resulting mixture shall contain as much dry lead arsenate as is equivalent to "18 oz. of arsenate of lead in the dry state to each 50 gallons of water."

Brand.	Weight to be taken. lb.	oz.	Brand.	Weight to be taken. lb.	oz.
Swift's	2	0	Hemmingway	2	0
Electro	1	11	Sherwin Williams	2	6
Foster's	2	11	Lewis Berger	2	0
Blue Bell	2	2	Federal	2	3
Red Seal	4	3	Austral	1	9
Nichol's or Our Jack	1	14	Carlton	2	5
Platypus	3	6	Vallo	1	14

Official Milk and Butter Records.

M. A. O'CALLAGHAN.

INCLUDED in this month's list of milk and butter records are a number of cattle representing Mr. Samuel Hordern's Jersey herd. Though nothing so far has approached the yield of his great cow, Leda's Snowdrop, still the average shown here is highly satisfactory from a breeder's point of view. The imported young cow, May Panora, in putting up a record of 431 lb. of butter for the nine months, has done extremely well.

The first record of the Holsteins is completed, and this representative of Mr. Lamond's herd has shown what the breed is capable of. A number of cattle, representing the Brundee herd, are being tested, and no doubt when figures are complete it will be shown that the Holsteins are able to hold their own on suitable country with any breed.

Another batch of records from the Darbalara stud is complete, and when it is remembered that they have had one of the severest seasons yet experienced in the Adelong district, the records of the cows here shown are excellent.

The features of recent records, however, is that of Mr. MacDonald's Jersey cow Coomassie. She has put up a record of 632 lb. of butter for nine months, which is a big improvement on her good record for last year; and as she is still milking well her record for the twelve months should be something which will make other breeders envious.

Mr. S. Hordern's Jersey Herd.

Period of Test.	Name of Cow and Herd Book No.	Age at beginning of Test		Date of last Calving	Total Milk.	Total Butter	Average Butter Fat Percentage	Yield on last day of test.	
								Milk.	Butter.
days		y.	m.	1913	lb.	lb.		lb.	lb.
214	Pearl of Retford (imp.), 1288.	5		29 April	4,537	329	6·2	15·75	1·15
214	Ponterson XII (imp.), 1301	5	2	5 May	4,097	329	5·9	17 00	1·40
243	Fawn IV, 1969	8	0	13 July	5,758	295	4·6	4 50	·29
242	Java's Valentine (imp.), 2111.	4	6	11 May	4,919	316	5·6	11·75	·82
214	New Year's Beauty (imp.), 2419.	3	6	15 ,,	4,323	264	4 5	15·25	·98
243	Retford Maid	2	11	22 July	3,750	273	6 4	10·25	·80
273	Retford Pet	6	0	3 October	3,402	234	6·2	8·50	·63
273	Retford Fawn	2	2	7 Sept	4,184	278	5 9	13·00	1·06
273	Retford May, 2559 ...	3	8	13 ..	4,232	315	6·4	12·50	1·07
273	Retford Blossom, 2557 ...	5	0	24 ,,	4,359	298	6·0	15 00	1·15
273	Noble's Twylish II (imp.), 1267.	4	7	18 October	5,474	352	5·7	15 00	1·21
273	Retford Princess	2	0	19 ,,	3,526	236	5·9	9 25	·72
273	Leda's Angel, 2200 ...	4	9	19 ,,	5,276	361	6 1	11·50	·97
273	Jersey Queen	14	4	1 Nov.	5,066	311	5·6	4·75	·40
273	May Panora, 2315 ...	4	6	5	6.582	431	5 9	16 00	1·38

Mr. A. C. Lamond's Holstein Herd.

Period of Test.	Name of Cow and Herd Book No.	Age at Beginning of Test.	Date of Last Calving	Total Milk.	Total Butter	Average Butter Fat Percentage.	Yield on last day of test. Milk.	Butter
days		years.	1913.	lb.	lb.		lb.	lb.
273	Olda XIV of Coolangatta	7	4 Sept. ..	14,667	544	3·2	41·75	1·64

Mr. C. R. G. MacDonald's Jersey Herd.

Period of Test	Name of Cow and Herd Book No.	Age at Beginning of Test	Date of Last Calving.	Total Milk.	Total Butter	Average Butter Fat Percentage.	Yield on last day of test. Milk.	Butter.
days		y. m.	1913	lb.	lb.		lb.	lb.
273	Brighton Zingara II ...	2 0	24 August ..	6,145	350	4·9	15·75	1·10
273	Maitland's Queen of St. Lambert's.	1 11	11 Sept.	5,570	309	4·8	17·00	1·05
273	Maitland Coomassie .	2 0	16 ,, ..	4,454	279	5·5	11·75	1·07
273	Brighton Vanilla II ..	2 2	3 Oct.	7,712	448	4·9	28·50	2·12
273	Coomassie, No. 917 ..	9 0	22 ,, .	11,140	632	5·0	36·00	2·52
273	Brighton Olive, No. 1624	3 11	30 Sept. ...	6,958	351	4·4	18·50	1·42
273	Brighton Petal II ...	2 7	7 Oct. .	6,137	396	5·6	16·25	1·38

Scottish-Australian Investment Company's Shorthorn Herd.

Period of Test.	Name of Cow and Herd Book No.	Age at Beginning of Test.	Date of Last Calving.	Total Milk	Total Butter	Average Butter Fat Percentage	Yield on Last Day of Test. Milk	Butter.
days		years.	1913.	lb	lb		lb.	lb.
212	Champion 4th, 1314 ..	5	31 July ...	4,600	219	4·3	6·0	·31
273	Champion 6th	2	26 Nov. ..	5,965	276	4·0	15·0	·63
273	Champion, 90	16	10 Sept. .	6,484	293	3·9	18·5	·81
273	Tottie 2nd	7	29 ,,	8,869	357	3·5	16·5	·56
273	Melba 5th, 1577	5	23 ,,	7,973	354	3·8	15·0	·61
273	Bloomer, 1295	5	13 ,, ...	7,779	359	4·0	20·0	·95
273	Melba 4th, 1576	7	4 Oct. ..	7,956	349	3·9	10·5	·51
273	Nina 2nd, 1110	9	9 ,, ..	6,042	247	3·6	14·0	·52
273	Virginia 2nd, 1788 ...	7	11 ,,	8,896	449	4·4	20·0	1·26
273	Rose, 630	13	20 ,, ..	5,338	245	4·0	16·5	·81
273	Rose 2nd, 1191	8	23 ,, ...	6,292	295	4·2	15·5	·70
273	Rose 4th .. .	2	2 Nov. ...	5,313	238	3·9	10·7	·55
273	Viola 6th, 1787	4	2 ,, ...	6,716	321	4·0	13·0	·57
273	Ethel 2nd, 1405	5	6 ,, .	7,175	345	4·2	26·0	1·25
273	Snowdrop 2nd, 1212 ...	8	23 Oct. ..	5,498	239	3·8	9·0	·35
273	Champion 3rd, 839 ...	9	17 ,, ...	7,422	402	4·5	3·5	·16
273	Lily 2nd, 1019	9	9 ,, ...	8,276	346	3·6	17·0	·65
273	Minnie 8th, 1588	4	27 Sept. ...	9,726	399	3·6	21·5	·92
273	Eva 2nd, 923	8	1 Oct. ...	7,132	357	4·3	14·5	·77
273	Melba 6th, 1578	4	27 Sept. ...	7,358	327	3·9	21·5	·88
273	Gem 2nd, 1462	8	11 Oct. ...	6,315	324	4·3	6·5	·31
273	Canary, 1308	9	30 Sept. ..	7,452	319	3·8	18·0	·83
273	Matilda 2nd, 434	11	22 Oct. ...	6,367	273	3·8	15·0	·64

Insectivorous Birds of New South Wales.

[Continued from p. 874.]

WALTER W. FROGGATT, F.L.S., Entomologist.

45. The Stone Plover or Land Curlew (*Burhinus grallarius*).

THIS shy, retiring bird is much better known to most people through its weird melancholy cry, or long drawn out whistle-like note, rather than by a personal observation of the bird itself. The calling of a pair of curlews in the long winter evening round the isolated homestead or the lonely camp fire is mournful enough to give the newcomer from the city a fit of the blues; but to the true imaginative bushman it is one of the "voices of the night" that rather appeals to his sense of fitness with the surroundings. In "Bush Wanderings," the author says, "Often striking a chill into the heart of the benighted traveller, for the imitation of the call of this bird is often a signal whistle from the bushranger to his mates at night."

The birds frequent open box forests and lightly timbered flats, seldom coming out on the open plains; and they may often be quite numerous without being seen by the traveller, for at the least alarm they stand perfectly still with the head and neck pointing out, and their grey and brown plumage blends so closely with the country they frequent, that it is usually an accident if one is seen unless it moves. They are, however, always alert, with their large bright yellow eyes watching the intruder, and are ready to run or fly as soon as they think they are noticed; but, otherwise, they will allow a person to come quite close, and pass them on the track without moving.

No regular nest is made, but, like the true plover, the female lays her two blotched brown eggs in a slight depression on the ground, where their ground-tint matches the soil, and does not display them to their enemies.

The curlews are usually found in pairs, except after the nesting season, when they are found in small family parties; and in the days when hawks were plentiful they suffered much from their attacks. Poisoning has killed out the hawks; but it has also, when used for rabbits, caused the death of many curlews who picked the pollard baits when feeding over the ground at night. Now, in the introduced fox, the enemy of all ground-nesting birds, there is another change in the balance of nature.

With reasonable protection the curlews will hold their own in all open forest country where settlement is not too dense, and, feeding chiefly at night, they capture and destroy many insects that are not out in the daytime. On account of their nocturnal habits they have been introduced into suburban gardens to keep down the slugs and snails, and in this capacity they are one of the best friends of the gardener.

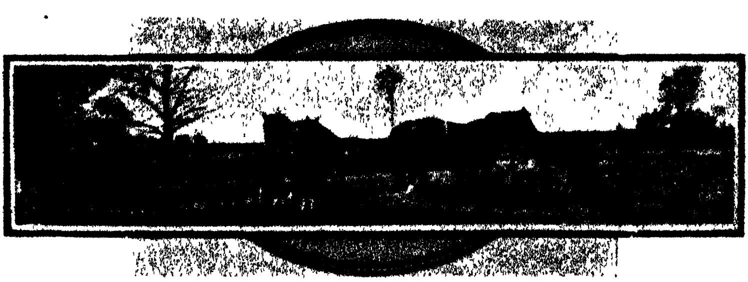
Our curlew has many popular names, such as the Land Curlew, Stone Plover, and Norfolk Plover; but it will always be known to the bushman as the Curlew. It must not, however, be confounded with the Curlew or Whimbrel of Europe, which, though having a somewhat similar call-note is classed in an allied group, and is quite a different looking bird. It is much larger, more mottled, and furnished with a long slender bill adapted for picking up water-insects and small crustaceans along the marshy sea coast.

46. The Spur-winged Plover (*Lobivanellus lobatus*).

This fine plover is met with in many parts of Australia, and though often found in small flocks upon the plains, it is much more common along the edges of creeks and swamps where it obtains much of its food. Here they are often a serious annoyance to the sportsman by suddenly flying up in front of him, and with their harsh call-notes warning the ducks and teal that would have otherwise been successfully stalked by the angry hunter. Many a wild duck has owed its escape from the game-bag by heeding the warning cry of the startled Spur-winged Plover.

Their habits and methods of nesting are similar to those of the smaller Black-breasted Plover, but in appearance they are very easily distinguished by their lighter colour, longer legs, and the curious wattles or naked growths below the eyes. The remarkable appendage from which they take their popular name of "Spur winged," consists of a sharp thorn-like projection on the point of the elbow of the wing; but though the spur should be a weapon of offence or defence, the writer has never seen them use it in any way.

All the plovers are looked upon as game birds in Great Britain, and plovers' eggs are imported from the Continent. In this country sportsmen were once accustomed to add them to their bag when other game was scarce, but under our latest regulations they are protected all the year round in consideration of their insectivorous habits.



Approximately one third natural size

INSECTIVOROUS BIRDS OF NEW SOUTH WALES

"THE STONE PLOVER OR LAND CURLEW."

Burhinus grallarius, Hall.

INSECTIVOROUS BIRDS OF NEW SOUTH WALES.

"THE SPUR-WINGED PLOVER."

Lobivanellus lobatus.

Approximately one-third natural size

Australian Wines as Sold in England.

A Report as to their Quality.

M. BLUNNO.

In order that the Department might gain an idea as to the quality and price of the more widely distributed brands of Australian wines as sold in London, the Agent-General was requested to purchase samples and forward them to Sydney. In all thirty-seven samples were obtained at retail shops in various parts of London, and the Agent-General's attention was arrested by the variety and cheapness of some Australian wines. In one case the price was as low as 13s. 6d. per dozen reputed quarts, and, as will be seen from the accompanying opinions of various judges, this was considered to be extraordinary value for the money.

In order that a comprehensive examination of these wines might be made, the following wine merchants were asked to co-operate with the Department:—Mr. E. M. Betts, Mr. L. Büring, Caldwell, Ltd., Mr. J. T. Fallon, Dr. T. Fiaschi, Mr. R. V. Gosché, Thomas Hardy & Sons, Ltd., Mr. T. H. Hyland, Mr. A. D. Kelman, Lindeman, Ltd., Penfold & Co., Ltd., Messrs. Tucker & Co., and Messrs. Westphal & Clark.

Two afternoons were set aside for tasting the wines. All the judges were not able to be present throughout the proceedings and thus the number of opinions quoted in the following table varies.

For obvious reasons, the names of the makers are not mentioned, and the opinions of the judges are given impersonally—*i.e.*, under a number, and not under their names.

The judges were not informed as to the brand of the wine they were sampling, but were notified as to the class of wine and the retail price in London. The numbers quoted are given for reference only, and are not those under which they were adjudicated. The specific name of the wine is also changed in these notes and substituted by the generic name of the class to which it belongs.

The individual opinions as to the quality of the wines are quoted in the following table:—

No.	Class and Price per dozen reputed quarts.	Judge No.	Remarks.
1	Chablis, 30s.	1	A good wine; well-made and matured; bouquet fair.
		2	Dry, very good sample.
		3	Nice, clean, palatable wine; worth the value.
		4	Fair
		5	Very good: condition and bouquet good.
		6	Splendid wine at the price; good type.
		7	Clean, round, soft, good condition.
		8	Full clean; good style of white export wine; rather full or Chablis; good condition.
		9	Clear, limpid; good colour; good odour; sound nice flavour; fresh; altogether a nice wine worth the money.
		10	Beautiful, dry wine; fine condition; a wine typical of our best Hunter River growth.
		11	Fine, well matured; beautiful bouquet; good condition; creditable wine that can compete with European vintages.

The individual opinions, &c.—*continued.*

No.	Class and Price per dozen reputed quarts.	Judge No.	Remarks
2	Hock, 30s.	1	Much the same applies to this as No. 1, though condition is less good.
		2	Very nice sample: flavour excellent, bouquet fair.
		3	Fine flavour; very good wine for the money.
		4	Fair
		5	Very clean good wine; excellent condition.
		6	Good sound wine; Hock type.
		7	Clean, dry, soft, good condition.
		8	Clean, fair condition; nice acidity; Hock style.
		9	Good condition; good colour; no bouquet, sound nice flavour; worth the money.
		10	Very fine, full Hock: beautiful condition; Australia should be proud of such wines; old in bottle.
		11	Lighter; well matured, same remarks as No. 1.
3	Riesling, 21s....	1	Traces of sugar left; condition wanting; colour broken.
		2	Colour bad, condition very much off, poor sample.
		3	Too heavy and cloudy; too hard, not a nice wine at all.
		4	Poor.
		5	Only fair; condition medium.
		6	Poor class: bad condition
		7	Bad condition; inferior.
		8	Bad condition; not Hock style; poor Riesling type.
		9	Cloudy, out of condition, too highly coloured, inferior in taste, not sound; not worth the money.
		10	Coarse; not nice, sound although has a sub-acid; not in same class with Nos. 1 and 2, not good condition.
		11	Unsound; dull.
4	White Wine, 22s	1	No character; over sulphured; otherwise clean, colour good.
		2	Clean, but quite a blended wine.
		3	Very high in colour, a mixture neither one nor the other.
		4	Go in London; characterless.
		5	No character, inferior wine
		6	Clean wine, too big but cheap, no class
		7	Good condition, dry, dark colour; white Muscat flavour; too coarse and heavy for Hock
		8	Clean, full, good export; good condition; strong bouquet.
		9	Too rich in colour, bad taste, inferior wine, not worth the money
		10	Very coarse, inferior, sweetish wine, not at all nice, condition good.
		11	Very common; woody, not clean; hard, no bouquet.
5	Riesling, 22s....	1	Wanting in character, flavouring and all else.
		2	Poor sample, no class.
		3	No Riesling character, too harsh and strong in taste.
		4	Poor.
		5	Strong Riesling; coarse and poor.
		6	Very coarse; good condition; too strong.
		7	Coarse, hard, inferior.
		8	Good condition, metallic taste; very poor quality.
		10	Good condition; very dry, coarse, common wine; iron taste; not at all nice.
		11	Styptic, inky; astringent; stalky; inferior.
6	Chablis, 22s.	1	Good clean wine but not Chablis type; little character
		2	Very good sample; excellent value.
		3	Very good wine, but not Chablis type. It is Verdelho grape, and first-class wine for English market.
		4	Very good for London; best wine.
		5	Medium Chablis, in good condition; full bodied.
		6	Good clean wine, but too heavy; not right type.
		7	Clean, good, full-bodied; too heavy for ordinary drinking.
		8	Good, clean, soft, fruity; good class of wine for export.
		10	Good condition; nondescript but fair wine; sound.
		11	Sound, slightly earthy taste; fairly good bouquet; a second-class wine.

The individual opinions, &c.—*continued.*

No.	Class and Price per dozen reputed quarts.	Judge No.	Remarks.
7	White Wine, 22s.	1	Coarse wine, sub-acid, too strong for ordinary consumption.
		2	Poor, common type
		3	Too strong and too dry; not palatable enough.
		4	Inferior
		5	Coarse wine, no character, good condition.
		6	Good clean wine but too heavy for drinking
		7	Coarse, inferior cheap.
		8	Condition fair; harsh and rough; strong flavour
		10	Sweet full wine; quite sound, nondescript; good condition.
		11	A rather full wine common taste.
8	Hermitage (White), 19s. ..	1	Little character, condition good, smothered in sulphur
		2	Good value, clean and dry
		3	A little too sharp, not soft enough: Hock type
		4	Fair, only just.
		5	Light fair wine, medium condition
		6	Good wine at the price, but not too sound.
		7	Light, wanted better handling.
		8	Slightly acetic, colour good
		10	Light wine, no character sound, fair condition.
		11	Clean rather young; sound, not much bouquet, fairly good; second class, a little hard.
9	Chablis, 18s	1	Clean and good, though young, good value for price.
		2	Young wine, clean, excellent value
		3	Very nice, palatable and soft wine, rather young, good value
		4	Good value, thin, not like Australian
		5	Light, poor wine, no bouquet
		6	Very good; soft good type, cheap at the price.
		7	Light clean little hard good cheap wine
		8	Clean, good style, does not taste pure Australian; good value.
		10	Sound, light, sweetish wine, good condition.
		11	Clean, sound, not much bouquet, soft, good sample.
10	Burgundy (White), 22s. .	1	A good wine with but little character, suitable for English markets, condition good, over sulphured
		2	Clean, thin, condition excellent, fair value.
		3	Good, clean, strong wine, well-matured
		4	Very fair, sulphurous, acid
		5	Nice wine, clean bright condition.
		6	Splendid condition, but too heavy, harsh.
		7	Similar to No. 6, clean full-bodied
		8	Overdosed with sulphur soft, good export wine.
		10	Good condition, good, clean, full wine
		11	Good, full, sound, not much bouquet.
11	Burgundy (White), 19s. ..	1	Condition and colour good, no character, young.
		2	Young, thin, fair value
		3	Fair wine for English market, but rather young.
		4	Rather poor
		5	Poor, coarse wine, inferior condition
		6	Poor wine, out of condition, no type.
		7	Coarse, inferior, bad condition
		8	Poor condition, not sound, volatile acids predominant.
		10	Full, fair wine, not delicate; quite sound
		11	Sound peculiar, Folle Blanche flavour.
12	Burgundy (White), 22s. ...	1	Condition and colour good, somewhat coarse, young.
		2	Sample poor
		3	Too dry and too coarse.
		4	Poor.
		5	Only fair, in good condition.
		6	Sound big wine, but too coarse.
		7	Coarse, inferior: fair condition.
		8	Strong flavoured, rather dark coloured
		10	Coarse, common wine.
		11	Sound, full, slightly hard.
13	Cabernet, 24s....	1	Good, palatable wine, too rich in flavour: condition and colour good.
		2	Clear, soft: good value.
		3	Too light for the English market, otherwise a very good wine.
		4	Good but light.
		5	Nice clean wine; good and sound.
		6	Clean wine; good condition, cheap at the price; fair type.
		7	Good, dry, clean wine
		8	Good condition; has not character of Claret; finishing off with Port character
		10	Good sound Claret; light and delicate.
		11	Good, clean, light: good flavour; a very good specimen.

The individual opinions, &c.—*continued.*

No.	Class and Price per dozen reputed quarts.	Judge No.	Remarks.
14	Hermitage (Red), 19s. ...	1	Clean and good; over sulphured; good value.
		2	Light, but good value.
		3	Too light for the home market, but good and sound.
		4	Good, rather, excellent value.
		5	Too sweet, sound; good otherwise.
		6	Good value; soft, but a little sweet.
		7	Still sweet, rich; too full for Claret.
		8	Good condition and value; very clean, real good style of Export wine
		10	Good sound wine, slightly sweet.
		11	Light, clean, soft, sound; good sample.
15	Claret, 13s. 6d.	1	Broken wine; too heavy colour and condition good; extraordinary value for price.
		2	Sample blended; excellent value; fair colour, good condition.
		3	A very good wine for the money, do not know how it is possible to sell Australian wine for that price at home.
		4	Excellent value
		5	Nice light Claret, good sound wine at price
		6	Very good wine at price; like blended wine, good type
		7	Very good; blended with Spanish or French light Claret.
		8	Good Claret style, very thin.
		10	Good sound wine really good.
		11	Very good wine, soft, clean
16	Red Wine, 22s .. .	1	Heavy and coarse, condition good and colour fair.
		2	Full and heavy; good London market value, condition excellent.
		3	A very good wine for the London market.
		4	Good London wine
		5	Strong, heavy, medium, rather coarse.
		6	Good big wine but rather coarse, good London wine
		7	Heavy, full, clean, coarse
		8	Full, clean, Porty character, the style of wine mostly sought after by London
		10	Sweetish wine; quite sound
		11	Fair sample.
17	Red Wine, 15s	1	Good sound wine clean, colour fair.
		2	Sound; thin, fair value, condition good.
		3	Rather light for the English market, but sound, and good value
		4	Good value
		5	Fair Claret character, sound.
		6	Good, clean, Claret type.
		7	Thin, dry, acid.
		8	Poor condition, volatile acidity.
		10	Good sound wine
		11	Youngish wine rather acetic.
18	White Wine, 31s.	2	Not altogether sound but soft on palate rather on thin side.
		3	Not a very good wine for price; not sound enough.
		7	Dry, white; acid, not too sound.
		10	Thin acid wine; not nice, sulphury.
		11	A good wine if it had been properly looked after.
		13	Plenty of character, peculiar.
19	Red Wine, 19s....	2	Not of market value.
		3	Not sound, should not be shown.
		7	Dry, red; putrid.
		10	Absolutely sour; no good.
		11	Vinegary.
		13	Poor quality; rough
20	Burgundy (Red), 30s. ...	2	Nice dry wine; very fair sample; suitable for English markets.
		3	A very good wine for the home market; well worth the money.
		7	Good, clean, dry; very good; good condition.
		10	Very nice; good old wine; very fine.
		11	Coarse, good flavour; full-bodied, creditable.
		13	Good quality.

The individual opinions, &c.—*continued.*

No.	Class and Price per dozen reputed quarts.	Judge No.	Remarks.
21	Burgundy (Red), 18s. ...	2	Cheap sample; on the young side; very fair sample.
		3	Very nice; a little lighter than No 20, but good value
		7	Young, dry, clean, sound
		10	Very fair wine, little rough but sound; young
		11	Young, full, sound, good.
		13	Very fair value, good.
22	Burgundy (Red), 22s. ...	2	Sound; on the young side, but still a very fair sample
		3	Very heavy, rather young, but a good English market wine.
		7	Big, rough, coarse, sound.
		8	Full, clean, fair style export; dry; good value.
		10	Coarse, rich wine, rough, young, sound.
		11	Young, rough sound, full-bodied.
		13	Nice wine, good value
23	Burgundy (Red), 19s. ..	2	Sound, full, very fair sample.
		3	A rather rough wine, but otherwise a very good wine for the English market
		7	Dry, rough, coarse, sound
		8	Good, clean, Burgundy type, excellent value.
		10	Very rough, sound, good, would not appeal to any wine drinker, being too rough
		11	Rough sound, full-bodied, typical for the English market.
		13	Useful export wine, good, but rather rough.
24	Burgundy (Red), 22s. ..	2	Full, sweet strain, big, fair sample.
		3	A strong wine good for English markets, but nobody would drink it here in Australia.
		7	Rich, full, heavy too big
		8	Full, slightly sweet good export type
		10	Very rough coarse wine, little sweetish; would not appeal to any wine drinker, being too rough and coarse.
		11	Rough, full-bodied, heavy, slightly pungent.
		13	Full and good
25	Burgundy (Red), 19s. .	2	Not altogether sound, on the acid side.
		3	Lighter than No 24, but not quite fit for English market; a little sour.
		7	Acid, unclean
		8	Volatile acidity, sweet-sour.
		10	Sour, very inferior
		11	Not quite sound.
		13	Fair quality.
26	Burgundy (Red), 22s. ...	2	Sample not altogether sound.
		3	No good at all
		7	Acid, unclean
		8	Volatile acidity mannitic.
		10	Very inferior, sour.
		11	Not sound
		13	Only fair
27	Burgundy (Red), 18s. ...	2	Not altogether sound
		3	Light wine, a little better than No. 26.
		7	Heavy, full lactic
		8	Sweetish, sounder than 25 or 26
		10	Sweet-sour, very inferior, better than 26.
		11	Not sound slightly sweet, sour.
		13	Fairly sound, rather sweet.
28	Burgundy (Red), 15s. ...	2	Clean, sound very good value.
		3	Light, but a very good wine for the money; palatable.
		7	Light, clean, blended, sound
		8	Sound, clean, not so full, real good value.
		10	Common wine, sound, young, seems to be blended.
		11	Good, clean, sound, full-bodied wine.
		13	Excellent value.
29	Red Wine, 20s.	2	Thin dirty, ordinary sample.
		3	A light, poor, sweet wine, not much good for trade.
		8	Sweet, bad condition, common, not too sound.
		9	Nondescript, sweet red
		10	Sweet red, inferior
		11	Fairly sweet, indifferent.
		13	Very ordinary, sweet red.

The individual opinions, &c.—*continued.*

No.	Class and Price per dozen reputed quarts.	Judge No.	Remarks.
30	Red Shiraz, 24s.	2	Dirty; poor sample.
		3	Sweet, cloudy and rather too sugary; an unclassified wine.
		7	Sweet red; tastes as if boiled must.
		10	Very sweet wine; quite sound; good sound wine.
		11	Very sweet; fairly sound.
		13	Poor quality.
31	Cabernet, 23s	1	Sweet wine; no character; clean
		2	Fair sample.
		3	Sweet,; very full-bodied, pleasant wine; good value.
		4	Sweet Jeropiga.
		5	Sweet.
		6	Ordinary sweet red.
		7	Sweet, fortified; ordinary sweet red.
		8	Sweet.
		10	Sweet wine.
		11	Sweet wine.
		13	Only fair.
32	Muscatelle, 30s.	2	Poor sample; not altogether sound.
		3	Not sound enough; similar to No. 31.
		7	Unsound 5·8 per cent. sugar, 2·1 per 1000 volatile acidity.
		10	Acid, not at all nice; not sound.
		11	Unsound; sweet enough, not creditable.
		13	Poor quality.
33	Muscat. 24s.	2	Poor sample.
		3	Not Muscat at all, more like sweet white
		7	Common sweet white.
		10	Little acid; peculiar wine, no Muscat flavour.
		11	Sweet white, not much Muscat flavour, woody taste.
		13	Fair
34	Muscat, 12s.	2	Out of condition; fair sample, flavour very good.
		3	A good flavour, but not quite bright; more ropy taste.
		7	8 per cent. sugar, 1·2 per 1000 volatile acidity, good flavour.
		10	Sweet acid; full Muscat flavour.
		11	A good wine; very strong flavour of Muscat; cloudy.
		13	Out of condition.
35	Muscat, 35s	2	Clean, very good sample; 35 per cent. spirit; 10 per cent. sugar.
		3	A very clean and tasty wine, the best Muscat so far.
		7	Clean, very good, sound; 10 per cent. sugar 35 per cent. spirit.
		10	Very fine wine, clear, good, sound; best of all Muscats so far.
		11	A good sound Muscat, very creditable; the best so far.
		13	Good condition, excellent
36	Muscat, 35s.	2	Condition, poor; young wine; very good flavour; in general, poor sample.
		3	Very light in colour; very sweet; sulphured very much to keep the wine.
		7	Light colour, sweet; bad condition: 28 per cent. spirit; would not keep; 10 per cent. sugar.
		10	Sulphur taste; clean; Muscat flavour.
		11	A good sweet wine, kept alive by sulphur.
		13	Out of condition.
37	Muscat, 29s.	2	Condition poor; sample poor.
		3	Very sweet; good flavour, but very cloudy; very strong in alcohol.
		7	15 per cent. sugar; very sweet; bad condition; 36 per cent. spirit.
		10	Very sweet; quite sound; clean wine.
		11	Very sweet; too sweet; very strong; in good condition.
		13	Out of condition; too sweet.

The wines were also submitted for analysis to the Chemists' Branch of the Department of Agriculture, and the results are shown in the following table.

TABLE showing analysis of Australian Wines purchased on the English market.

No.	Class.	Price. Per dozen Bottles.	Price. Per dozen Flagons.	Alcohol by volume	Equivalent in Proof Spirit.	Fixed Acidity as Tartaric Acid.	Volatile Acidity as Acetic Acid.	Extractive Matters.	Invert Sugar.	Tannin.	Ash.
		s. d.	s. d.	%	%	%	%	%	%	%	%
1	Chablis	30 0	...	14·74	25·83	·55	·09	2·31	...	...	·22
2	Hock	30 0	...	13·38	23·45	·56	·08	2·23	...	...	·22
3	Riesling	21 0	...	12·77	22·38	·49	·14	2·22	...	...	·236
4	White Wine	22 0	33 0	14·27	24·03	·39	·12	2·38	...	...	·29
5	Riesling	22 0	...	11·70	20 50	·51	·12	2·40	...	...	·315
6	Chablis	22 0	32 0	13·90	24·36	·38	·10	2·27	...	...	·242
7	White Wine	22 0	33 0	14·46	25·34	·41	·16	2·55	...	...	256
8	Hermitage (White) ...	19 0	29 0	13·52	23·70	·54	·163	2·16	...	...	·2
9	Chablis	18 0	27 0	11 08	19·42	·49	·15	3·62	1·70	...	·245
10	Burgundy (White)... ...	22 0	33 0	14 09	24·69	·50	·115	2·22	...	...	·258
11	Burgundy (White) ...	19 0	27 0	12·96	22·71	·45	·18	1·94	...	...	·195
12	Burgundy (White)... ..	22 0	33 0	13·52	23·70	·36	·204	2·05	...	...	·2
13	Cabernet	24 0	39 0	13·71	24·03	·40	·09	2·61	...	·043	·304
14	Hermitage (Red)	19 0	29 0	13·99	24·52	·38	·154	2·63	...	061	·282
15	Claret	13 6	...	13 24	23·21	51	·13	2·63	·10	·074	·274
16	Red Wine	22 0	23 0	15·49	25·01	·42	·12	3·38	·40	·104	·315
17	Red Wine	15 0	...	12·58	22·06	·50	·165	2·78	·28	·084	·286
18	White Wine	31 0	.	13·71	25·67	·41	·11	2·12	...	...	·238
19	Red Wine	19 0	29 0	14·27	25·01	·43	·24	2·89	...	·059	·327
20	Burgundy (Red)	30 0	...	12 58	22·06	·51	·12	2·72	...	·11	·30
21	Burgundy (Red)	18 0	...	15 21	26·66	·46	·096	2·53	...	·076	·283
22	Burgundy (Red)	22 0	33 0	14 65	25 67	·47	·13	3·40	...	·133	·318
23	Burgundy (Red)	19 0	29 0	13 99	24·52	·44	·12	2·40	...	...	·315
24	Burgundy (Red)	22 0	33 0	14 09	24·69	·50	·115	2·22	...	...	·258
25	Burgundy (Red)	19 0	27 0	14 93	26·17	·49	·17	2·97	...	·054	·297
26	Burgundy (Red)	22 0	33 0	13·52	23·70	·36	·204	2·06	...	...	·2
27	Burgundy (Red)	18 0	27 0	15·21	26·66	·45	·151	3·38	·35	091	·292
28	Burgundy (Red)	15 0	...	13·52	23·70	·48	·15	3·01	·32	·09	·301
29	Red Wine	20 0	...	19·87	34·82	·41	·1	5·53	2·45	·034	·276
30	Red Shiraz	24 0	...	17·08	29·92	·44	·07	19·08	17·04	traces	·26
31	Cabernet	23 0	...	17·08	29·92	·36	·17	11·44	8·0	·016	·36
32	Muscatelle	30 0	...	15·96	27·97	·44	·21	9·52	5·86	...	·347
33	Muscat	30 0	...	17 92	31·41	·45	·15	12·82	10·26	...	·255
34	Muscat	42 0	...	15·18	27·15	·33	·12	11·31	8·25	...	·317
35	Muscat	35 0	...	19·96	34·98	·35	·06	13·21	9·92	...	·30
36	Muscat	30 0	...	16·43	28·78	·35	·07	12·95	10·15	...	·325
37	Muscat	29 0	...	20·61	36·12	·24	·057	17·48	15·30	...	·336

The amount of invert sugar shown in the column under that heading should be deducted from the figures expressing the "Extractive matters."

The Pioneers of the Export Trade.

Australian wines have for some time been exported to England, and the demand is steadily increasing. One enterprising Englishman, Mr. P. Burgoyne, some years ago, began to import small quantities of Australian wines, which he sold to a few friends. The business prospered, and advertising on a

large and costly scale made known to the people of the United Kingdom the wines of this country. Several other firms ventured in the business, and almost everyone in the British Isles now knows that there are Australian wines to be had on the market.

Great credit is due to the pioneers of the Australian wine trade in England, and the feature of this relatively new trade is that wine is made accessible to the middle classes. A taste has been created for certain wines that are typical of certain Australian districts, like the country both sides of the Murray in Riverina, other parts of Victoria, and South Australia. These wines are rich wines, in so far that they contain from 24 to 27 or 28 per cent. of proof spirit, and are rather heavy in colour and extractive matters. To attenuate the little roughness which is characteristic of these wines, merchants usually prefer that traces of grape sugar should be contained in these wines—as a rule, not more than ½ per cent., which is sufficient to give the wine fruitiness, without tasting sweet. Wines of the type described form the bulk of the wine exported from Australia, and are generally known among growers as wines for the British market, or shipping wines. In London, however, they are known as Burgundy, truly a misnomer, because the French wines of Burgundy are altogether of a different kind. A certain proportion of Australian white, full-bodied, strong wines, either dry or fruity, are also to be found on the British market, and are called White Burgundy, or by some trade name. These white wines are, generally speaking, produced in the same districts from which the Australian Red Burgundies come.

British merchants of Australian wines would prefer these wines to contain 27 or 28 per cent. of proof spirit; but only a portion of them reach this percentage, because, to obtain such a degree of strength, it would be necessary to have grapes with 27 or 28 per cent. of sugar. This amount of sugar is quite common in the grapes grown in the Riverina districts, and in certain parts of Victoria and of South Australia; but, as a rule, the grape-juice obtained from such grapes is made into sweet wines of the Port types, for which there is a great local demand. The kind of wines already described find an ever-increasing favour among the middle classes of the United Kingdom, principally because of their accessible price and of their character. They are rich, luscious, strong wines, suited as a drink for people living in a cold climate.

Lighter wines are also put on the English market, such as Clarets, Hocks, and Chablis. Their sale, however, is more limited, but this is not because of their quality, but because, for good wines of this sort, there is a ready local sale at remunerative prices. It may be, also, that the Australian firms which produce these lighter wines, finding the local trade to be quite remunerative enough, do not care to expend large amounts for advertising, not knowing then whether they would finally secure a number of customers who, so far, have preferred Continental wines. French and other Continental wine firms have for centuries looked on the markets of the United Kingdom as one of the most valuable, and have long established a chain of connections

of mutual interests, sometimes even of international character, and they naturally strive with might and main to hold their own. Furthermore, several British firms now own vineyards and cellars in France, Spain, and Portugal; therefore, only by creating a similar situation in Australia, and by forming powerful companies with Anglo-Australian capital, will it be possible to give a greater impetus to the Australian wine trade in England.

The Quantity Exported.

The following statistics* show the amount of the heavier and lighter Australian wines imported into England. Wines up to 23 per cent. proof spirit may be taken to represent the Australian Clarets, Hock, and Chablis. All the others, from 24 per cent. up to 28 and 29 per cent. represent the heavy, dry red or white wines called Burgundies, the great majority rich and fruity, while a certain proportion of them are slightly sweet, and those are the wines containing the higher percentage of alcohol—that is, 27 or 28 per cent. of proof spirit.

The Australian wines of the lighter type, ranging from 17 to 23 degrees of strength, amount to 96,593 gallons, and those from 24 to 29 degrees total 667,166 gallons. France imports into the United Kingdom 1,846,976 gallons of the lighter wines, with a strength of from 15 to 23 per cent. of proof spirit, and 143,914 gallons of the heavier wines from 24 to 29 per cent. proof strength.

Germany exported to England 143,914 gallons of wines, containing 15 to 23 per cent. of proof spirit, and 231,746 gallons of the heavier wines from 24 to 29 per cent. proof strength.

It is natural that Australia should beat both France and Germany in the quantity of the heavier class, because the colder French and German climates do not allow the production of strong wines, except in the few cases of wines specially made with grapes that have been allowed to hang on the vine, and so concentrate the sugar strength. It seems to me that, since there is a big market in England for wines with from 15 to 23 per cent. proof spirit, totalling upwards of 2,000,000 gallons, an endeavour should be made to encourage vine-planting in the colder districts of Australia, a policy which I have always advocated

The total importation of Spanish wine containing from 24 to 29 per cent. proof spirit amounts to 2,061,789 gallons, and of Portuguese wines to 616,070 gallons, as against 660,166 gallons of the same strengths from Australia, which further shows that we have in Australia districts with, at least, the same climate as the most important vine-growing districts of Spain and Portugal, where we could produce more wines of such types.

In the case of every country exporting wine to England there is a sudden drop in the quantity after the wines with 29 per cent. proof strength, which is evidently due to the Customs duty levied on wines with a higher degree of spirit. In the case of Australian wines there are only 7,351 gallons at

* Return published by the British Board of Trade for 1912.

30 per cent., and but a few hundred gallons of superior strength. On the other hand, the quantity of wines from Spain and Portugal increases again gradually, and reaches the maximum for wines between 32 and 38 per cent. proof strength, which, in the case of Spain, amounts to 448,907 gallons, and, in that of Portugal, 2,470,142 gallons. The Spanish wines are evidently Sherries, or of similar sorts, and the Portuguese are all Port wines.

Wines from 30 per cent. proof spirit upwards are all fortified. A large quantity of this class is produced in Australia, but they find a ready local market.

The Quality of the Purchased Samples.

From the remarks made by the judges on the Australian wines sampled, it will be seen that, out of the thirty-seven wines under review eighteen were considered good, and among them some excellent; six were classified as of medium quality; nine were indifferent; and four were set aside as of bad quality.

It strikes me as astonishing how any wine of indifferent quality, let alone such as have deteriorated, should be put on the London market. Australian wines for a long time have been looked down upon, and it is only quite recently that the efforts of worthy pioneers have succeeded in catching the favour of some of the public. The harm done to the trade in general by those merchants who sell inferior wines is very great, as it counteracts the progress made by those who sell a product creditable to this country. I notice also that some firms sell the wines in very cheap bottles, use inferior corks, and the labels show an absolute lack of good taste.

Conclusion.

Before closing this report I would emphasize the opinion expressed in the foregoing that, to quickly gain more ground on the British market, not only should there be a large increase in the output of light wines, both red and white, but what is more essential is that more capital should be put in the business. The advent of a few more strongly financed Anglo-Australian companies for the production and marketing is eminently desirable.

Seed Testing for Farmers.

The Department is prepared to test vegetable and farm crop seeds. Reports will be given stating the germination capabilities of the seed, its purity, and the nature of the impurities, if any.

Communications should be addressed to the Director, Botanic Gardens, Sydney. Not less than 1 ounce of small seeds such as lucerne, or 2 ounces of large seeds like peas, should be sent. Larger quantities are to be preferred. Seeds should be accompanied by any information available as to origin, where purchased, age, &c.

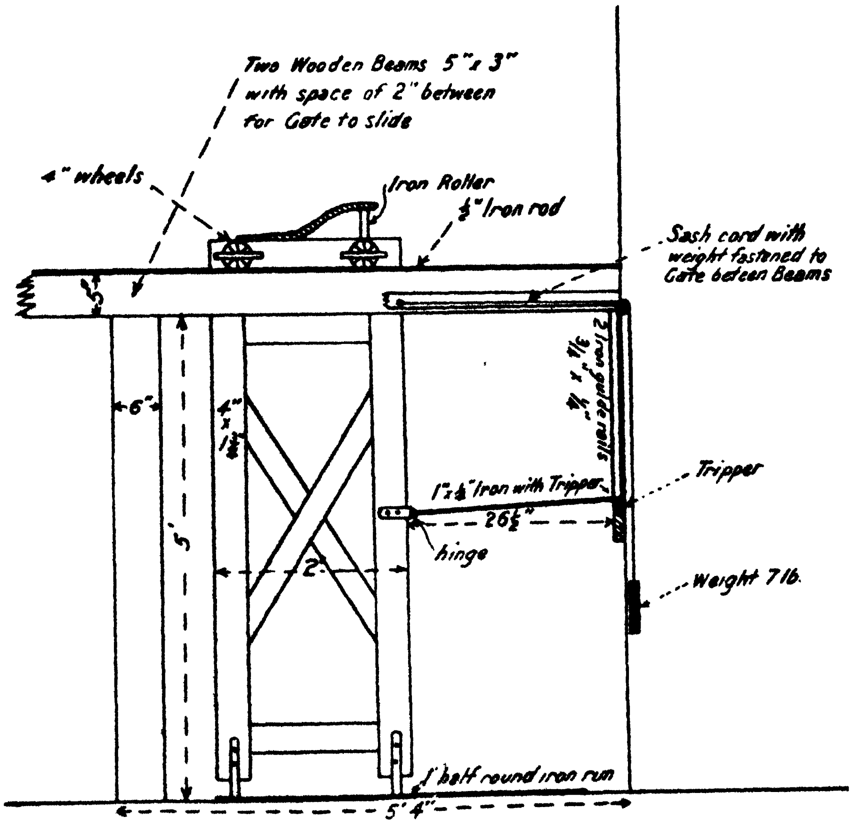
If a purity report only is desired, it should be so stated, to secure a prompt reply. Germination tests take from six to twenty days, according to the seed.

Cow Bails at Bathurst Experiment Farm.

R. W. PEACOCK, Manager.

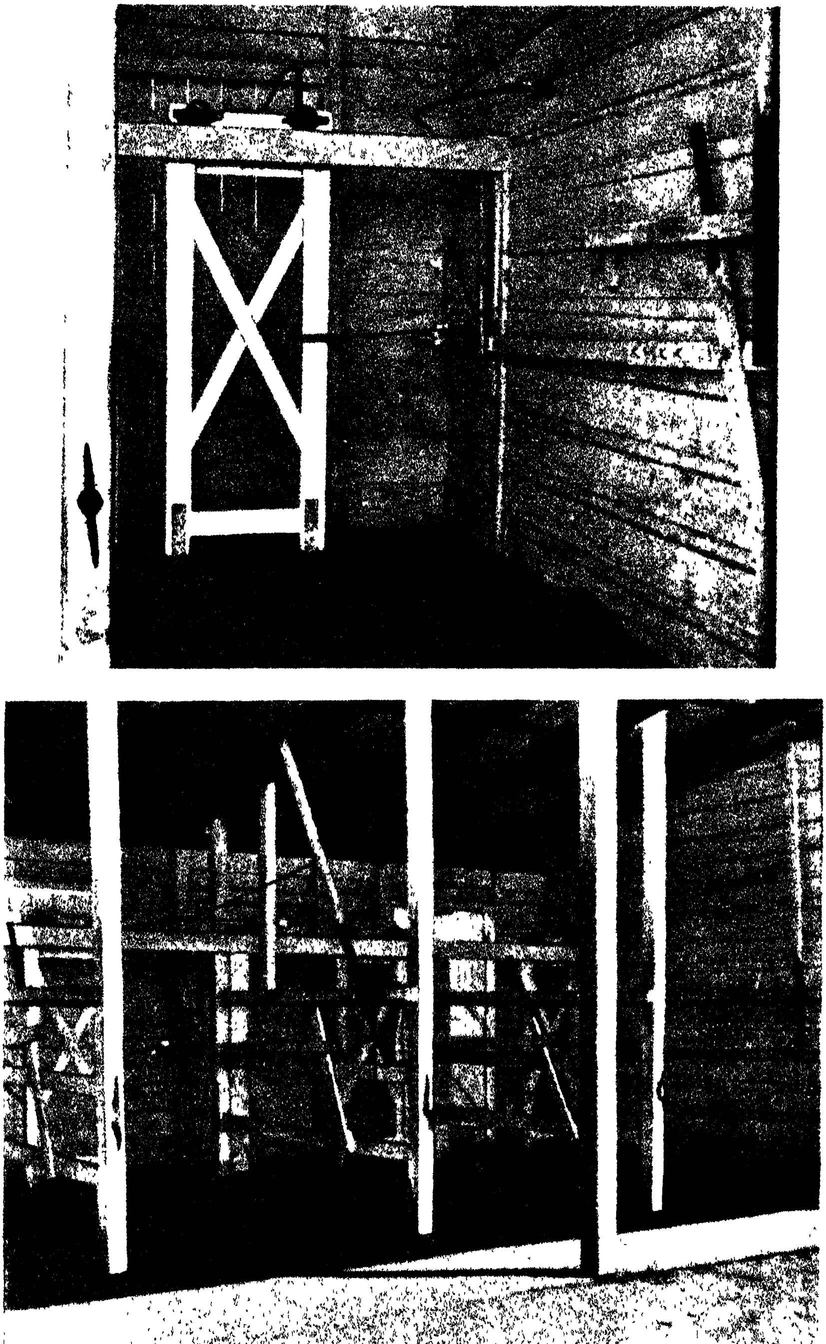
CONSIDERABLE interest has been aroused in the cow-bails in use at the Bathurst Experiment Farm, and some of the many visitors have expressed a wish to have plans of them. The bails were designed for hand-milking, and have been used for the past five years, giving no trouble, and proving a great convenience.

The principal objects kept in view in designing the bails were :—The cow to be bailed and released without changing her position ; the operator standing behind her whilst bailing and letting out ; the fittings on the floor to allow of easy cleaning ; the doing away as far as possible with complicated cords, and the durability of working parts. These objects have been fully attained. The accompanying photographs and sketches of working parts and details should render their construction comparatively simple.

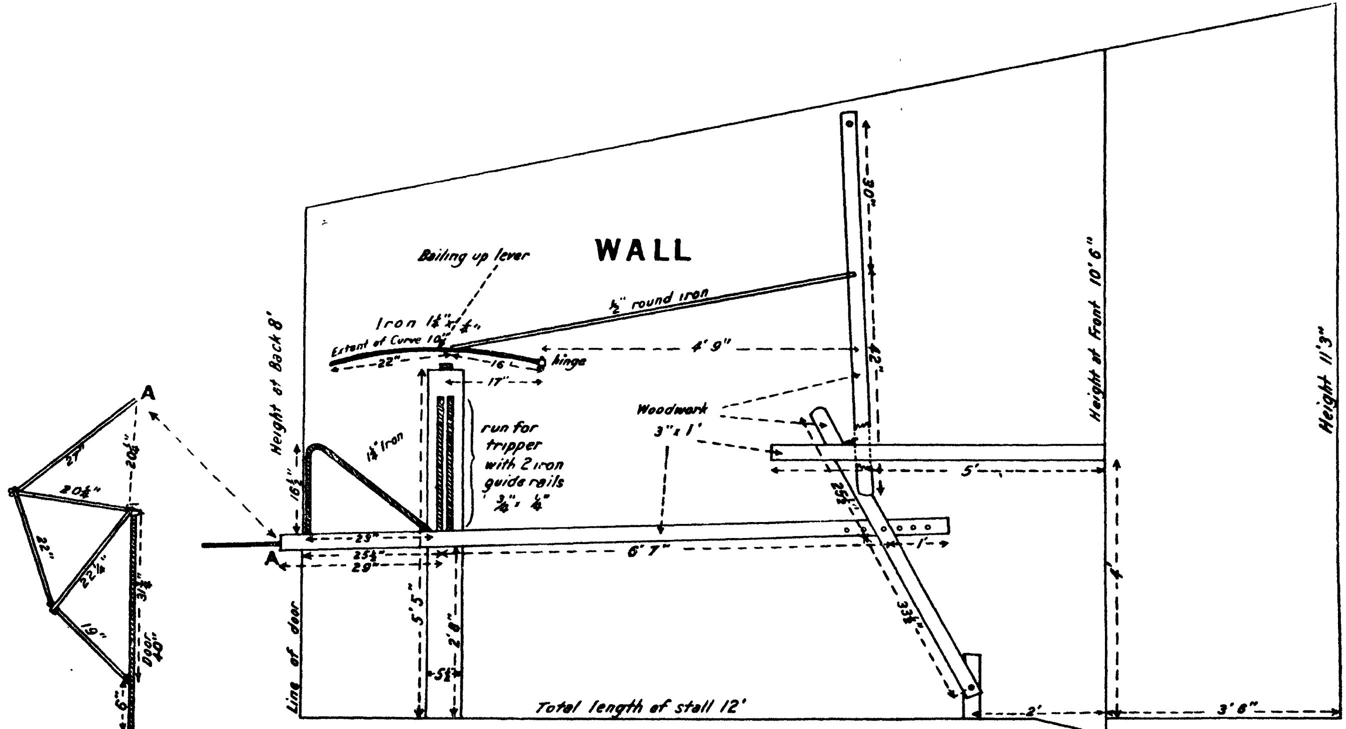


ELEVATION OF SLIDING GATE.

COW BAILS AT BATHURST EXPERIMENT FARM.



COW BAILS AT BATHURST EXPERIMENT FARM



PLAN OF LEVER SYSTEM ON DOOR

ELEVATION OF SIDE WALL

Cow Bails at Bathurst Experiment Farm.

A Descriptive Catalogue of the Scale Insects ("Coccidae") of Australia.

[Continued from page 882.]

WALTER W. FROGGATT, F.L.S., Entomologist.

Fiorinia expansa, Maskell.

Trans. New Zealand Institute, vol. xxvii, p. 51, pl. ii, figs. 8-13. 1894.

Specimens found at Bankstown, Richmond, and Ballina, New South Wales, upon a Ti-tree (*Melaleuca linarifolia.*)

Female puparium snow white, first pellicle standing out dark yellow, second hidden under white secretion that appears to be deposited in regular ridges. A few fine hairs stand out from the first pellicle; the whole scale broad and convex. Length from $\frac{1}{25}$ to $\frac{1}{16}$ inch. Male puparium white, with a single pellicle, cylindrical and not carinated.

Adult female yellow, elongated, segmented, cephalic extremity and truncate, minute median depression, no lobes, on either side two or three very short spines; no spinnerets.

1177. *Fiorinia expansa*. Cat. Coccidæ, p. 246.

Fiorinia fioriniæ, Targioni.

*Stude sulle Coccinigli*e, p. 14. 1867.
Pellucida, Targ. Catalogue, p. 42. 1868.
Signoret, *Ann. Soc. Ent. France* (4), vol. ix, p. 449. 1869.
Camelliæ, Comstock, *U.S. Dep. Agr. Report*, 1880, p. 329.
Camelliæ, Maskell, 1821. Froggatt, 1889.

This species is well known in Australia under Comstock's name of the Camellia Scale. It is common in gardens upon many different shrubs, and also in the bush on *Leptospermum*, and on hothouse plants, palms, ficus, tea plants, and ferns; and has a wide range over the world.

Female puparium yellowish brown to dull white, pellicle yellow; a prominent carina down the centre darker in colour; elongate sides, straight or very slightly curved, anterior margin truncate.

Adult female elongate, colour dull orange yellow. Pygidium with five groups of circumgenital glands; median lobes open at base, serrate on inner margin, second and third pairs small, close together, about four plates on either side of the median lobes.

Maskell has named a variety (1897) from Amoy, Formosa, and Australia, on camellia, ficus, and palms *var. minor*.

1178. *Fiorinia fioriniæ*. Cat. Coccidæ, p. 246

Fiorinia geijeriæ, n.sp.

This coccid was found on the foliage of *Geijeria salicifolia*, near Narrabri, New South Wales.

Female puparium black, fringed with white secretion, nearly oval or elongate oval, but variable in form. Length, $\frac{1}{50}$ inch.

Adult female yellow, elongate, cephalic portion forming three lobes on the outer margin; abdominal segments well defined, rounded on the outer margin. Rostrum large. Pygidium darker yellow, with the outer margin serrate, terminating in what appears to be a semicircular lobe hardly projecting, with a deep rounded indentation on either side, between which and above the lobe are a row of spiny chitonous processes or spines about ten in number. A few scattered spines on the sides of the segments of the abdomen.

Fiorinia lidgetti, Green.

Victorian Naturalist, vol. xvi, p. 14. 1900.

Collected at Myrniong, Victoria, upon the bark of two gum trees, *Eucalyptus rostrata* and *E. goniocalyx*.

"Female puparium of the ordinary mytiliform shape, rather narrow, usually more or less curved, moderately convex, snow white, pellicles bright reddish orange, but the second skin more or less covered by a thin whitish film. Length about 3 mm." Green.

Male puparium same colour, smaller, loose in structure, without a keel, pellicle deep orange.

Green says that the female puparia is exactly like *F. casuarinæ*, but the coccid differs in having a depression between the median lobes, which are broad, little produced and strongly carinated.

Adult female oblong, broadest across abdomen, with numerous oval pores on dorsal surface. Pygidium without lobes or squames, dorsal area distinctly longitudinally striated. Dorsal spines long, circumgenital glands in five groups. Length, 0·50 mm.

1178. *Fiorinia lidgetti*. Cat. Coccidæ, p. 246.

Fiorinia nephelii, Maskell.

Ent. Monthly Magazine, vol. xxxiii, p. 242. 1897.

Trans. New Zealand Institute, vol. xxx, p. 234, pl. xxiv, figs. 6–10. 1898.

In a paper in the first-named magazine, Maskell published a list of specimens sent by Professor Koebele, and collected during a tour in China and Japan. Speaking of this coccid, found upon *Nephelium longana* in minute pits in the leaves, he says: "Female puparium very small, brownish, pellicles yellow, second pellicle showing through it; form irregularly elliptical. Length, $\frac{1}{35}$ inch.

"Male puparia upon the leaf not in pits. White, sub-cylindrical, not carinated, with pellicle yellow. Length, $\frac{1}{40}$ inch.

"Adult female completely enclosed in second pellicle and very difficult to extract, the coccids living in groups of three or four in all stages of development in the pit-like galls upon the foliage. Colour brown. Length, $\frac{1}{50}$ inch.

Abdomen ends in a depression with serrated sides, with a few short marginal spines."

1184. ***Fiorinia nephelii.*** Cat. Coccidæ, p. 248.

Fiorinia rubra, Maskell.

Trans. New Zealand Institute, vol. xxvi, p. 71, pl. iii, figs. 15-18. 1893.

This species was described from specimens obtained from West Australia on the foliage of the Raspberry jam wood (*Acacia sp.*).

Female puparium, true colour brownish white but so hidden by the second pellicle that only a small portion of the secretion shows, and it has a general dark orange or reddish tint. Pellicles elongated, rest broadly rounded, the whole broadly pyriform. Length, $\frac{1}{30}$ inch.

Male puparium elongated, narrow, flattish, not carinated, longer than female.

Adult female dark orange, elongated, abdomen ending in two broad lobes close together, nearly straight, with many serrations and spines on the margin. No spinnerets, but many large single orifices.

A variety from the Mallee Gum scrub in North-western Victoria was called *var. propinqua* by Maskell (1897), somewhat lighter in colour, and the anal segment of female differs in structure.

1186. ***Fiorinia rubra.*** Cat. Coccidæ, p. 248.

Fiorinia syncarpiæ, Maskell.

Trans. New Zealand Institute, vol. xxv, p. 212, pl. xi, figs. 14-15 1892.

Specimens obtained near Sydney upon the foliage of the Turpentine gum (*Syncarpia laurifolia*).

Female puparium very indefinite, forming masses on the leaves, the two pellicles forming a somewhat elliptical convex scale, covered with numbers of fine white filaments or threads. Length, $\frac{1}{50}$ inch.

Adult female brownish yellow, form elongate. Length, $\frac{1}{70}$ inch. Pygidium deeply serrate, terminating in two large median lobes serrate at tips, with smaller lobe on either side. No groups of spinnerets, but a few scattered single ones.

Male puparium more definite in form than that of female, subcircular, consisting of a yellow pellicle and loose white cottony filaments. Larger than the female scale.

1194. ***Fiorinia syncarpiæ.*** Cat. Coccidæ, p. 250.

Genus XI. *Chionaspis*, Signoret.

Ann. Soc. Ent. France (4), vol. ix, p. 442. 1869.
Comstock, *Report U.S. Dep. Agri.*, 1880, p. 313.
Green, *Coccidæ of Ceylon*, part 11, p. 105. 1899.
Newstead, *Mon. British Coccidæ*, vol. 1, pp. 174, 179.

The female puparium usually white, elongate or elliptical, and generally dilated behind. Pellicles at anterior extremity flattened and overlapping. The form of the scales of different members of this genus is very variable; Newstead defines it as "pyriform, or mytiliform"; Green says, in some long

and narrow, in others so widely dilated as to appear almost circular. He considers that this genus comes close to the genus *Diaspis*. The point of difference is that in *Diaspis* the pellicles in the female scale are completely surrounded by the secretionary matter, while in *Chionaspis* the first pellicle always projects beyond the anterior margin. Adult female elongate, ovate, with all the segmental divisions well defined; pygidium usually lobed.

Male puparium narrow, elongate, and smaller than that of the female. The members of the genus are widely distributed all over the world. About fifty-six species are now retained in this group, and about twenty-five have been separated and placed in new genera. It is represented in Australia by six described species upon our native flora, and the cosmopolitan species *Chionaspis citri* ("White Louse" of the orchardists) on the citrus trees.

Chionaspis agonis, Fuller.

Trans. Ent. Soc. London, p. 471. 1899.

The specimens were collected near Perth, West Australia, on a native plant, *Agonis flexuosa*.

Female puparium straight, long, and narrow, slightly convex; pellicles pale yellow, remainder of scale, dull white; length, 0·13 inch. Male puparium white, with a slight median carina.

Adult female elongate, light yellow. Pygidium rounded, median lobes short, wide, diverging at the apex, truncate; outer lobes smaller; five groups of circumgenital glands.

1035. *Chionaspis agonis*. Cat. Coccidæ, p. 213.

Chionaspis assimilis, Maskell.

Trans. Royal Society, South Australia, p. 102. 1888.

This species was described from South Australia on *Eucalyptus*.

The female puparium elongate pyriform, slightly curved, scarcely convex. Dark brown, pellicles yellow. Length, $\frac{1}{10}$ inch. Male puparium brownish yellow, smaller.

Adult female brown, usual elongate form, with distinct segments. Abdomen with two terminal lobes and spines on either side; five groups of spinnerets, but only two or three in each group. Length, $\frac{1}{15}$ inch.

Comes close to *Chionaspis citri*.

1038. *Chionaspis assimilis*. Cat. Coccidæ, p. 214.

Chionaspis citri, Comstock.

Chionaspis euonymi, Comstock, *U.S. Dep. Agri. Report*, 1880, p. 313.
Comstock, *2nd Report Dep. Ent. Cornell University*, 1883, p. 313.
Maskell, *Trans. New Zealand Institute*, 1884 and 1892.
Maskell, *Coccidæ of New Zealand*, p. 54, 1887.

The common white orange scale, or "White Louse" of the Australian orchardists, and a serious pest when neglected, covering all parts of the citrus trees and fruit with its brown and white scales. It was first recorded as an orange scale in Florida, U.S.A., whence it was probably accidentally introduced into Australia.

Fig. 1. *Chionaspis eucalypti*

Fig. 2.—*Chionaspis eugeniæ*

SCALE INSECTS OF AUSTRALIA. Plate VII.

Female puparium dull blackish brown, with a greyish margin, pellicles reddish brown, elongate, convex, with a slight dorsal central ridge, fitting close on to its food plant. Length, $\frac{1}{16}$ inch. Male puparium white, elongate, rounded at apex, transversely ribbed with distinct dorsal carina. Pellicle dull yellow. Length, $\frac{1}{28}$ inch.

Adult female yellowish white, form elongated, segments distinct, abdomen terminating in six lobes, central pair largest, with some marginal spines. No groups of spinnerets, but a few single ones.

1043. *Chionaspis citri.* Cat. Coccidæ, p. 214.

Chionaspis ethelæ, Fuller.

Trans. Ent. Soc., London, p. 471. 1899.

Found upon foliage of an undetermined species of *Eucalyptus*, growing near Perth, West Australia.

Female puparium dull white, elongate, broadest behind; pellicles reddish brown. Length, 0·1 inch.

Adult female with two longish median lobes and three pairs of lobules.

Male puparia delicate white, elongate, sides parallel, distinctly tricarinate, with two fainter carinæ between the three distinct ones.

1051. *Chionaspis ethelæ.* Cat. Coccidæ, p. 216.

Chionaspis eucalypti, n. sp. (Pl. VII, fig. 1.)

Found upon the bark of the branches and stems of *Eucalyptus Sieberiana* growing near Mittagong, New South Wales.

Female puparium greyish white, covered with a fine granulated varnish-like secretion, giving it a crystalline appearance and slight brown tint. Pellicles bright deep yellow, first one forming a distinct stalk at base with second nearly hidden in secretion. The whole scale tapering into a regular turbinate or fan-shaped form, rather convex, with the apical margin somewhat irregular. Length, 3 mm. Female scales thickly clustered together; male scales scattered among them. Male puparia small, elongate, ridged, snow white, pellicle dull yellow. Length, 1 mm.

Adult female elongate, reddish brown, pygidium deep yellow, very chitonous and finely striate. Cephalic and thoracic segment narrow, round in front, abdominal segments deeply segmented on outer margins into four rounded lobes, the first very broad, and the fourth narrow. Pygidium rounded, slightly pointed at apex, terminating in two broad rounded lobes broadly separated from each other, with three pairs of smaller lobes and several stout spines on either side, forming a fringe round the outer margins. The first one after the terminal lobes small and pointed, the next rounded, others irregular; central orifice large; circumgenital glands numerous, appear to form a half circle round the central orifice.

Chionaspis eugeniæ, Maskell. (Pl. VII, fig. 2.)

Trans. New Zealand Institute, vol. xxiv, 1891, p. 14, pl. 1, figs. 10-12; and p. 211, 1892.

One of our commonest species in Victoria and New South Wales, where it is found upon the foliage and twigs of a number of different native shrubs,

described upon *Eugenia elliptica*: it is also recorded upon *Leptospermum, Melaleuca, Persoonia,* Grass-trees and *Eucalyptus.*

Female puparium white, pyriform, very broad at the apex, rather flattened. Length, $\frac{1}{10}$ inch. Pellicles small, pale yellow.

Adult female yellowish brown, elongate, apical depression with two main lobes, and four small lobes on either side; five groups of spinnerets.

Male puparia white, elongated, forming indistinct masses of soft cottony secretion beneath which the individual scales are more or less hidden. Pellicle yellow.

This scale is also recorded from China, Japan, Ceylon, and the Hawaiian Islands. A very fine variety is found upon the under surface of the leaves of the Waratah (*Telopea speciosis*) in the Gosford district, New South Wales, for which Green has proposed the name of *var. major.*

1133. *Phenacaspis eugeniæ.* Cat. Coccidæ, p. 238.

Chionaspis nitida, Maskell.

Trans. New Zealand Institute, vol. xxiv, p. 15, pl. 1, figs. 13, 14. 1891.

Specimens taken upon the foliage of *Daviesia corymbosa,* near Adelaide, South Australia, and on the same plant from Southern Victoria, the male and female puparia thickly covering the surface of the leaves.

Female puparium snow white, with the first pellicle yellow, and the second greyish; general form like a short, slightly curved horn, the base small, the rest of uniform width to the apex, slightly convex; form often irregular. Length, $\frac{1}{11}$ inch.

Adult female golden brown; very similar in general structure to *C. eugeniæ,* but has no stout spines in the abdomen, and differs in the groups of spinnerets.

Male puparium very much smaller, pellicle reddish brown, rest white, short, broad, rounded at apex, with an impressed dorsal line from behind the pellicles to the apex, slightly convex.

1070. *Chionaspis nitida.* Cat. Coccidæ, p. 220.

Chionaspis xanthorrhœae, Fuller.

Trans. Ent. Soc. London, p. 472. 1899.

Found upon the grass-like foliage of the Grass-tree (*Xanthorrhœa sp.*) near Perth, West Australia.

Female puparium shining white, pyriform, with the pellicle pale yellow.

Adult female yellow, last segment of abdomen with wedge-shaped depression, short conical lobes, and two spines between them; five groups of circumgenital glands.

Male puparium white, not carinated, smaller than female scale, pellicle pale-yellow.

1090. *Chionaspis nitida.* Cat. Coccidæ, p. 226.

Chionaspis xerotidis, Maskell.

Trans. New Zealand Institute, vol. xxvii, p. 50, 1894, pl. ii, figs. 6–7.

Specimens found upon the foliage of a sedge (*Xerotes longifolia*), growing in the sea-sand at Botany Bay, New South Wales.

Female puparium pyriform, rather flat, white, pellicles yellow, small. Length, $\frac{1}{8}$ inch.

Adult female yellow, elongate, a small median depression on the abdomen, on each side four small rounded lobes with short spines, with shiny spines on the sides of thoracic and abdominal segments. Five groups of spinnerets.

1142. *Phenacaspis xerotidis*. Cat. Coccidæ, p. 239.

Genus XII. *Maskellia*, Fuller.

Agricultural Gazette of New South Wales, vol. viii, 1897, p 579.

This genus was formed by Fuller for the reception of a remarkable coccid that aborts the foliage of eucalypts, forming swollen galls on the twigs and horned, pit-like galls on the leaves.

"Adult females inhabiting galls formed on twigs, abdomen covered by exuviæ; antennæ and legs absent; last segment of abdomen of normal diaspid character, flattened and chitonous, bearing appendages common to the group.

"Adult males forming tubular galls formed upon leaves. The habit of producing and inhabiting galls renders the erection of a new genus necessary."

Maskellia globosa, Fuller.

Agricultural Gazette of New South Wales, vol. viii, 1897, p. 579, pl., fig. 1–6.

Female galls gregarious, aborting the young twigs of several species of eucalypts into irregular gouty swellings; within this soft aborted tissue the globular or flask-shaped adult purple-black female coccid is embedded with the elongated abdomen pointing outward, smooth, and showing no signs of segmentation; the anal segment semi-transparent. The female galls vary much in shape and form, but the shape of the chamber is usually pear-shaped.

The male galls are horn-shaped pockets projecting from the upper surfaces of the leaves and closed on the underside with a white wad or skin.

Types described from specimens on *Eucalyptus comphocephala*, "Tooart," Swan River, West Australia.

1280. *Maskellia globosa*. Cat. Coccidæ, p. 282.

Poultry Notes.

JAMES HADLINGTON.

November.

Having completed the series of notes on "Seasonable Work for Poultry-keepers" for twelve months, and as most of the information contained in them will shortly be available in another form, I propose to deviate somewhat from the lines previously followed, and while giving reminders of "Seasonable Work," to deal also with matters of current interest and prevailing conditions affecting poultry-keepers. By this means it is hoped to keep in close touch with those engaged in the industry. Many new recruits to the ranks of poultry-keepers are apt to be swayed by temporary conditions, and draw deductions based upon a limited experience, thereby arriving at altogether erroneous conclusions, and unfortunately some of the writers on poultry matters, while posing as authorities, are little better informed. At any rate, the basing of conclusions upon a limited experience is one of the pitfalls that should be avoided by the poultry farmer.

Position of the Egg Market.

Poultry-keepers have been somewhat concerned, and complaints have been made regarding the prices of eggs during the months of August and September This has in some quarters been attributed to over-production, but if we study the previous months of the year (January to July inclusive) it will at once be seen that the prices during this period were quite normal in comparison with previous years. The following table, which has been supplied by the Government Statistician, shows the average wholesale or paper quotations ruling for "new-laids" from month to month from 1909 to the end of September, 1914.

	1909.		1910.		1911.		1912.		1913.		1914.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
January	1	4	1	3	1	0	1	2½	1	3¾	1	2⅛
February	1	5	1	5¼	1	5¾	1	4½	1	6¾	1	6¼
March	1	6¾	1	8	1	8¾	1	8½	1	9½	1	9⅜
April	1	11⅝	2	0½	2	0	2	1¼	2	2	2	2⅛
May	2	2	2	0¾	2	0	2	2⅛	2	4⅛	2	1⅛
June	1	9	1	6¾	1	10⅜	1	11	2	0	1	9⅛
July	1	5	1	5	1	4	1	6⅛	1	5	1	6¾
August	0	11¾	0	11	0	11¼	1	1¼	1	0	0	10⅜
September	0	10½	0	10⅛	0	10¼	0	11¼	0	11⅛	0	9¼
October	0	10½	0	10½	0	10	1	0½	0	10⅛	......	
November	1	0	0	11⅛	0	11¼	1	1¼	0	11¾	......	
December	1	2	1	1¼	1	1	1	4¼	1	1	......	

It may be pointed out that quotations from week to week over the two months under review were extremely erratic, varying between 8½d. and 11½d. per dozen for new-laids. Naturally the 8½d. stands the most prominent in the mind of the producer, it being some years since such a price was in evidence, except from the occasional lapse of a day or two. However, it will be seen that with the exception of August, 1912 and 1913, when prices were abnormally high, owing to wet weather conditions reducing the output, eggs for August, 1914, notwithstanding the adverse conditions prevailing, were approximately but ¾d. per dozen lower than the corresponding month of the years 1911–10–09, which would more nearly represent the normal.

This lowered price should be attributed rather to prevailing conditions. The first of these was a particularly mild winter, especially the month of July, during which the favourable weather generally brought the hens on to "full lay" somewhat earlier than usual. This in itself would have the effect of lowering prices earlier than in the years showing the reverse conditions, particularly the two years mentioned, 1912 and 1913, both of which were extremely bad in August as regards weather over the area where the bulk of the eggs are produced (that is to say, within 50 miles of Sydney). The lessened production from this cause during those two periods would be the cause of higher prices, but these are the years with which it is sought to compare prices.

The next factor in lowering prices this August and September, was the condition arising out of the war, and which resulted in fewer eggs being put into cold storage. When all these factors are taken into count, it is contended that there is no cause for a pessimistic view in regard to the prospects of the industry, and I am convinced that over-production has nothing whatever to do with it, but that the slightly reduced values are only of a temporary character, due to prevailing conditions.

The "bogey" of over-production has been raised from time to time in connection with our dairying industry, as well as with meat and other products, yet these industries have grown larger and larger, and more profitable to those engaged in them. What has happened with these products will to a large extent be repeated in the poultry industry, as it is known that a large and profitable export trade in eggs is possible, and only waits the quantity to draw upon. There is, therefore, no need to anticipate over-production, but our position at the present time is that we are barely producing sufficient eggs to meet our own requirements. In proof of this, I need only refer to an experience of some few weeks ago, when, owing to a comparatively small shipment being exported, prices at once jumped from 8½d. to 11d. This being the case, it can be readily understood that with our limited egg production, just as soon as our market is touched for export, prices would go up to a level that is calculated to strangle it. A large export trade in eggs is now practicable, and will come about when we have more eggs available, and when we recognise the value of co-operation with that object in view.

Commercial poultry farmers recognise that anything like 10d. per dozen during the cheap season, with correspondingly higher prices in the scarce period, and food-stuffs at anything like normal value, is a payable price for eggs, and it is rare that they go below that price, even for a few days. The present price of food-stuff presents a more formidable problem, and although due to temporary conditions, is calculated to be a serious handicap for the present; but such temporary conditions cannot to any appreciable extent effect the permanent expansion of the poultry industry.

"Dead in the Shell."

The so-called "dead in the shell" problem has been the subject of much inquiry recently, in fact, it has for a long time constituted an evergreen subject during the hatching season. The cause of "dead in the shell" could almost be compressed into a word—"weakness." The chicks are dead in the shell because they are too weak to get out. All sorts of theories have been propounded to account for it, which for the most part are proved to be untenable as a sole cause. such as hardness of the shell, drying out of the moisture, atmospheric changes in the incubator, too much or too little ventilation, the poisonous effect of too much carbon dioxide, &c. While any or all of these may be contributing factors, insomuch as they would have a weakening effect on the embryo, they are not in themselves the supreme cause, neither is there any mystery about it. The time to prevent the occurrence of a lot of "dead in the shell," is often many months prior to the egg being laid, in other words, we must look to the breeding stock and the conditions under which they are kept. Until more attention is given to the development and stamina of the stock that it is intended to breed from, "dead in the shell" will continue to be an annual experience of some magnitude. At the same time it should be understood that every fertilised egg is not bound to produce a chicken, that some "dead in the shell" is quite a natural circumstance, but they should be taken as representing the weaklings, just in the same way as weaklings die off after emergence, and the living ones represent "the survival of the fittest." It should be the aim of the poultry-farmer to raise the percentage of the latter, by breeding from sound constitutioned and properly developed breeding stock kept under good conditions. At the same time, it should be borne in mind, that faulty incubation will result in weakening the embryos. The popular notion that chickens die in the shell for want of moisture at hatching time is altogether incorrect.

When chickens are slow in coming out and the yolk is only partly absorbed, which is another evidence of weakness, drying out takes place, together with adherence to the shell, and toughening of the membrane surrounding the chicken, all leading to the notion that want of moisture is the trouble, whereas it is the weakness of the chicken, which has failed to hatch before equalisation of the surrounding moisture and air had taken place. This has left the skin and shell dry before the chick has emerged, but in these cases no amount of applied moisture can enable such to hatch out into normally strong chickens

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

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Wyan	Mr. C. W. Harper, Myrtle Creek Railway Station
Wyong	Mr. Edgar J. Johns, Wyong.
Yass	Mr. Cyril Ferris, Yass.

Notice to Honorary Secretaries.

It is important that a record of the meetings of the branches should be inserted in the *Agricultural Gazette*, and honorary secretaries are invited to forward to the Department a short account of the proceedings of each meeting, with a brief summary of any paper which may have been read, and the discussion that followed it, as early as possible after each meeting. Notes for insertion in the *Agricultural Gazette* must reach the Department before the 16th to ensure insertion in the following month's issue.

Insect Pests.—Quite a number of the branches have availed themselves of the Department's offer to supply a set of insects, being the common pests of the district, and the collections are now being cased. The Government Entomologist suggests that as each district has certain pests peculiar to its orchards and gardens, more useful work would be done if the members themselves collected the local pests (orchard, garden, and stock) and sent them to the Department, where they would be arranged, mounted, a descriptive label attached, and returned to the branch. Mr. Froggatt considers that such a collection would have a far greater value, as there would be more interest attached to the specimens when the members knew exactly where the pests came from, and where and how to find them.

Veterinary Lectures.

In connection with the lectures to branches of the Agricultural Bureau, it is herewith pointed out for the information of honorary secretaries that the following is the list of subjects of lectures which can be delivered to them:—

Horses.—(1) Conformation and Unsoundness (with lantern illustrations); (2) Colic and Treatment of Wounds; (3) Strangles, Influenza, and Tetanus.

Cattle.—(1) Tuberculosis (with lantern illustrations); (2) Contagious Abortion and Contagious Mammitis; (3) Ticks, Tick Fever, Tick Infestation and Eradication.

Sheep.—Parasitic Diseases of Sheep.

Pigs.—Diseases of Pigs.

General.—(1) Parturition of Farm Animals (with lantern illustrations); (2) Feeding of Farm Animals and Dietetic Diseases; (3) Sterility: Causes and Treatment in all classes of Stock.

REPORTS AND NOTICES FROM BRANCHES.

Balldale.

The annual meeting of this branch was held on 12th September, when the following office-bearers were elected for the ensuing twelve months:—Chairman, Mr. Cuthbert Howard; Vice-Chairmen, Messrs. P. Salmon and R. Pollock: Hon. Treasurer, Mr. P. Salmon; Hon. Secretary, Mr. H. Elrington.

Borambil.

The monthly meeting was held on 2nd September, when a large attendance of members discussed the most suitable summer crop for the district. At the conclusion of the discussion, it was generally agreed by those present that a succession of Manchurian millet, maize, and sorghum would prove most satisfactory.

Collie.

A meeting was held on 26th September, when opinions were exchanged about the various kinds of wheats growing in the district. Mr. S. D. Murray gave a short account of the following operations being carried out in connection with next year's experiment plots. The Secretary invited all members to visit his place during the next week to inspect the various kinds of wheat, oats, &c., being tried there, and a good number promised to do so.

Coraki.

The following paper was read by Mr. C. Patch, Chairman of this branch, at the September meeting:—

Potato Growing.

The potato holds first place among vegetables, and the importance of the crop can, therefore, hardly be over-estimated when we consider the enormous quantities annually consumed in our large centres of population, and anything that can be done to improve its quality and the production should be of great interest, especially to the farmers on the rich land of the mid-Richmond district, where some very heavy crops have been grown. I would not advise anyone to plant too largely till he thoroughly understands the business, for the seasons may prove disappointing and one or two failures have caused some farmers to turn down potato growing altogether. Neglect to keep the crop clean or the land properly tilled is often the cause of failure. I have heard it said by farmers who own some of the best land that they cannot grow enough for their own use.

The best months to plant are July, August, September, and October. High land in sheltered situations should be planted in July, to get the crop off before the warm, dry weather, as such land dries out much quicker than on the flats, and the heat of the sun will cause the tops to droop, checking the growth of the tubers and causing them to run in strings. Late varieties should not be planted on high land, but planted in low situations early in the season, say August, they will give by far the best results. The large tops, with plenty of moisture in the soil, will force the tubers in the cool soil, but directly the soil becomes heated the tubers cease to grow, and crops planted too late often run to too much vine and strings. I have known potatoes planted in November produce a successful crop, but they were planted in very low land, and weather conditions were favourable. Early varieties should be planted 3 feet apart by 1 foot in the rows, and late varieties 3 feet 6 inches to 4 feet by 1 foot in the rows. In covering, horses should not be allowed to walk on the potatoes, as the seed may be bruised and cause many misses.

Suitable land is a great feature in potato growing, and I would turn down clayey soil altogether as the potato requires deep porous soil. The old wild duck swamps, well drained and deeply and thoroughly tilled, will give the best results. These old swamps seem to be most adaptable for spring and summer crops, as the cool situation seems to aid the growth of the tubers, and the much despised Circular Heads will prove as remunerative as any other variety if planted in August, the earlier the better, as it is a long-maturing variety. I give Circular Head first place as heaviest cropper, provided the season is suitable and the crop is not checked by late frost. I would like to see the men on the old duck swamps try a bag or two of seed each year, planting, if possible, the first week in August. They are inclined to run to vines if planted late, but there are other varieties just as bad in this respect. Early Vermont is a splendid early potato, and Brownell's Beauty is the best middle cropper. Snowflake is a good eater, and as the name implies, very flowery. I hope that the experiments undertaken by members will have good results, and that they will put up a good exhibit in the six-variety collection for the branch's prize at the next Coraki Show.

DEPARTMENTAL NOTE.—It is considered that September and October planting is too late, and also that 1 foot in the rows is too close, 15 to 18 inches being a better distance.

Courangra.

The usual monthly meeting was held on 8th October, when a general discussion took place on early peaches suitable for the district, manuring of orchards, and the use of the American pack. It was arranged that Mr. Geo. W. Hitchcock should prepare a paper on manuring as applied to orchards for next meeting. Mr. Warland also agreed to prepare a paper for the following meeting. Members were very pleased at the prospects of the season, owing to the splendid spring rains.

Henty.

The report of the Secretary of this branch, which was submitted at the annual meeting, stated that during the year seven regular meetings were held, when papers were read that led to interesting and valuable discussions, and different views were given and criticised. Several demonstrations and lectures were also given by Government experts. A fine collection of specimen sheaves of cereals was received from the Department of Agriculture, also sample bags of wheat, barley, oats, and rye, and parcels of prime chaff. The sum of £1 11s. was received as subsidy from the Government, being at the rate of 10s. in the £ on members' fees, and the Department of Agriculture has done its utmost to assist and encourage. The membership during the year was thirty-two, but there are a large number, especially of the younger farmers, who have not yet identified themselves with the movement, and whose support would be welcomed.

Inverell.

A lecture on maize culture was delivered before this branch on 25th September, by Mr. F. Ditzell, Inspector of Agriculture, the treatment of the subject being on somewhat similar lines to the lecture at Little Plain, which will be found reported under that heading.

Kellyville.

The annual report of this branch, which has been forwarded by the Secretary, states that a number of useful lectures and demonstrations were given during the year by members of the branch and officers of the Department of Agriculture. During January twenty-five members visited Hawkesbury Agricultural College for the purpose of seeing the orchard in fruit, and of observing the processes of preserving and drying. Samples of sheaves of wheat, oats, and barley were received from the Department of Agriculture, and an interesting discussion took place on the different varieties, and the best for the district. At a special meeting on 15th August, the sum of £5 was donated to the Red Cross Fund. Fifty members paid their subscriptions during the year.

Lankey's Creek (Jingellic).

The monthly meeting of this branch was held on 19th September, when a most interesting and instructive discussion took place on the question, " Which is the best class of sheep suited for the district ?" Papers were read by Messrs. H. W. Germer, W. D. Gifford, and G. J. Nichols. A lengthy discussion took place after the papers were read, and the meeting finally agreed that from an all-round point of view, the Lincoln-Merino cross was the most suitable and most profitable.

Little Plain.

The following is a report of a lecture delivered by Mr F. Ditzell, Assistant Inspector of Agriculture, to members of this branch, on 6th August last :—

The Cultivation of Maize.

Maize is of American origin, but it is largely cultivated all over the world, the United States alone producing about 2,500,000,000 bushels annually. The estimated production in New South Wales for the past season was 4,359,000 bushels from 161,918 acres, an average of 26·9 bushels per acre. New South Wales produces about half of the Commonwealth's maize, and about ½ per cent. of the world's total production.

Maize is a deep-rooting plant and suitable soils for maize production are, therefore, those possessing depth, friability, good natural drainage, and moisture-holding capacity. The Inverell soils are well suited for the production of good maize crops, especially the deep, free alluvials and the deep, rich, black and chocolate soils. The lighter red soils do not produce such heavy crops. The natural fertility of the soil should be maintained by growing the maize in rotation with wheat and other crops, a practice to which this district is well suited. The humus content should also be maintained by the ploughing in of maize stalks where practicable, instead of burning them, and generally by the ploughing in of weed growths. The Inverell soils are naturally rich in lime, nitrogen, potash, and phosphoric acid, and provided a rotation is practised, the humus content maintained, and the soil properly prepared for planting, it is doubtful whether manuring will prove profitable, except on the lighter red soils and the older cultivated paddocks. Manurial trials in connection with the farmers' experiment plots have been conducted in the district for several seasons. In 1910-11, on red soil, the application of 1½ cwt. of a complete manure per acre resulted in an increase of 9½ bushels per acre ; in 1911-12, on similar soil, with the same manuring, an increase of 2⅔ bushels per acre was obtained ; while in 1912-13, on the same soil, an extensive manurial trial

was conducted with unsatisfactory results. Last season, the application of 1½ cwt. of a complete manure on a rich alluvial soil, which had been continuously cultivated for thirty-four years, resulted in a slightly decreased yield, but weather conditions were partly responsible for this, as the manured plot grew more quickly than the unmanured plot, and suffered more from the adverse weather experienced in February. Further manurial trials will be conducted next season both on alluvial and on red soils, which should enable more definite opinions to be expressed.

The soil should be ploughed in June and July for preference, and about 6 inches deep, but care should be taken not to turn up too much new soil in any one season. Generally the use of the mould-board plough is to be preferred. This early ploughing enables the rains to penetrate readily into the soil and subsoil, to be conserved for use by the growing crop, while the action of frost and weather conditions generally break the rough ploughed soil down and bring it into a state of good tilth, and unavailable plant food in the soil is converted into available forms. Any growth of weeds should be checked by the use of the harrows while the weeds are young, or, if they have a good hold, spring-tooth cultivators or skim ploughs. This surface cultivation also aids in the conservation of soil moisture, although, fortunately, owing to their high lime content the Inverell soils possess a self-mulching surface which naturally checks the evaporation of soil moisture. The final ploughing to prepare the land for the drilling in of the maize or for the purpose of ploughing the maize in, where such a practice is followed, should only be shallow so as not to bury the sweet surface soil or destroy the firm seed bed, which is necessary for proper plant feeding and moisture movement. Subsoiling for maize has not proved a success. Rolling should only be practised on ground which is cloddy and open at planting time, as a result of improper preparation, and should then be followed by the harrow to check undue evaporation.

October, November, and the first half of December are the most favourable months for sowing in this district. On the higher lands the sowing may commence at the beginning of October, or earlier under special circumstances, but on the flats, which are subject to frost, it is wise not to start sowing until about the middle of the month. The maize is best sown in rows 4 feet 6 inches to 5 feet apart in the red and chocolate soils, and 5 feet or a little wider apart in the richer alluvial soils. The usual method of sowing in this district is to drop two or three grains about 30 inches or a little more apart in the rows and cover by ploughing in—in which case the ploughing should not be too deep—or by drilling out furrows, dropping in these, and covering with harrow. The use of the maize dropper is recommended, especially in the lighter soils or where manuring is practised, in which case the maize is planted about 2 inches or 3 inches deep in the bottom of the furrows, single grains usually being sown at intervals of about 15 inches. This latter method is known as listing and is the most suitable one for dry country. When the plants have reached a height of a few inches the ground should be harrowed to partially fill in the furrows and smother any young weeds growing thereon. Where the land is very dirty the maize is sometimes sown on the check system by striking out drills both ways and sowing in the intersections. This method entails extra labour, but enables the crop to be kept clean by admitting of cultivation both ways. In the United States a machine is used to enable planting to be carried out on this system without much extra trouble.

After-cultivation, by harrowing the young crop and later by cultivating between the rows with tine, spring-tooth, and disc cultivators, is necessary to destroy weeds and conserve moisture. Commence cultivating to a depth of 2½ inches to 3 inches, but get shallower as the season advances, so as not to cut the roots. Partial hilling with the cultivators only should be practised in order to brace up any maize plants inclined to fall about. The expense of removing suckers is not warranted by the results obtained. Detasselling of every second row is practised when breeding improved strains of maize, but is not at present a practicable field operation.

Various insect pests damage the maize plant at different stages of its growth. The seed in the ground is often damaged by beetles, and occasionally by a small dark ant which eats out the germ. Cutworms often destroy the young plants as they come through the ground, while aphis occasionally affect the growing plants. These pests are not serious in this district, and good cultivation methods will reduce their attacks to a minimum. The cobs and grain are attacked by caterpillars, which let rain on to the cobs, resulting in mouldy grains, and permitting sparrows, moths, weevil, mice, and other pests to increase the damage, but again no serious damage results in this district except in isolated instances.

The varieties of maize recommended for this district are Early Yellow Dent—a quick-growing variety especially suitable for early or late sowing—Funk's Yellow Dent, Reid's Yellow Dent, Improved Yellow Dent—three early and mid-season varieties suitable for the main crop—and Leaming—a late mid-season variety and a heavy

yielder. The local large yellow maize, when carefully selected, also gives very good results. Other varieties, such as Riley's Favourite and Cornplanter (white) have given very good results, but the varieties mentioned above will, on the average, yield best. An important point in maize growing is the selection of proper seed, and suitable cobs should be selected in the field from the most prolific plants, provided such cobs are true to type, uniform, well filled over tips and butts, and generally of high quality. As maize so readily hybridises, the farmer should confine his attention to two or three varieties only, so that he may keep them reasonably pure.

Lower Portland.

The following paper was read by Mr. A. Watkins at the meeting of the above branch on 14th September:—

Pea Culture.

The most suitable soil for growing peas is a heavy loam or a black stiffish soil. They do well on either of these classes of soil, and will yield about three good pullings for an early spring crop. They will also do well on light sandy soil if the season is favourable, but will not yield nearly so well as the crops on the better soils. For the poorer soils the position also must be good and the crop planted very early, when the prices are generally good, and thus offer some recompense for the poorer yield. If, however, the season is dry, crops on the lighter soils are a certain failure. Peas do not require so much rain as most other crops, especially when the peas are filling out, as under wet conditions the pods become spotted, and the sale a less ready one. Notwithstanding that the peas when shelled are equally as good as those in clean pods, good buyers will only have the cleanest of pods, the black or spotted ones falling to the cheap hawker.

Having selected the piece of land for the crop, the first step is to thoroughly cultivate the soil, making it as sweet and friable as possible, as peas will not thrive if the soil is any way sour. The drills should then be made about 3 feet apart, and about 2 or 3 inches deep, according to the moisture in the soil.

It is a matter of opinion which are the best kinds of manure for peas. They do very well indeed with either stable or stockyard manures, which, I contend, are the best of all. Of the artificial manures I like blood and bone and superphosphate—blood and bone for preference. The manure is dropped along the drills, and the seed sown from 1 to 2 inches apart, using from ¾ to 1 bushel of seed to the acre. The best variety of pea is the Yorkshire Hero, and in my opinion it stands alone. There are several new varieties which mature a little earlier, and though they do not produce the quantity, they are well worth growing on account of their earliness. One is the Daisy, another the American Wonder, and yet another newly introduced to Australia is Greenfeast, which is said to be the heaviest cropper of all, and the quickest maturing dwarf culinary pea that it is possible to obtain. It is fit to pull in seventy days from planting.

When the peas are well up, it is well to go through them with a small scuffler, which is a splendid little implement for that purpose, doing its work just under the ground, and leaving the surface nice and flat. In a couple of weeks time they require to be windrowed with the hoe or pronged hoe, finishing up again by putting the scuffler through. In about three weeks time they should be backed up very lightly with the plough, the middles being either ploughed out or scuffled, according to choice. I prefer the plough. Some growers hill the peas with the hoe and then scuffle out, but this is a more tedious operation.

In this district the best time for planting for a spring crop is the first and second weeks in May, and with a favourable time Yorkshire Hero will be fit to pull about the beginning of September. The other varieties would probably be a fortnight earlier.

July is also a very good time for planting, as the peas are fit to pull about the end of October, when the glut in the market is over; for a Christmas crop plant about the first week in October. Of late years, however, the Christmas crop is risky, on account of large shipments coming in from Tasmania at that time.

Discussion.—A general discussion followed the reading of the paper, during which Mr. J. J. Herps said that one year he experimented with an acre of peas, using three kinds of manures. Section No. 1 he manured with fowl manure; section No. 2 with stockyard manure, and section No. 3 with a special pea fertiliser. At the beginning section No. 1 showed the best, the other two being about equal, but by the time the peas were fit to pull there was no difference to be seen.

Mr. R. Lowe also said that he had at the present time a bed of peas, in part of which he had some time previously grown a crop of cowpeas as green manure; where this crop had been the present peas were far superior, both in appearance and productiveness, to the part of the bed where there had been no cowpeas.

Many other useful hints were thrown out, and it was plainly evident that farmers are at last beginning to realise that the stable and stockyard manures, previously left almost unheeded, are valuable assets on the farm.

DEPARTMENTAL NOTE.—Regarding the statement of Mr. Lowe that he found a crop of peas doing best where cowpeas had been previously ploughed in, it should be noted that the practice of following one legume with another is not advocated. The success in this case may be a mere coincidence, and it should not be accepted as indicating a rule that can be safely followed.

Martin's Creek.

The usual monthly meeting of this branch took place on 10th September.

Questions placed in the "question box" were dealt with, and were as follows:—

(1) What is the cause of "Maori" on oranges? The question was answered from the Department's publication "Insect and Fungus Diseases of Fruit-trees."

(2) Which is the best time to commence pruning in this district? The month of June was favoured by the majority of the members present

(3) What is the best time to plant out citrus trees? Opinions varied greatly on this question, almost every month from March to September having been tried by different members, with satisfactory results.

(4) Which is the best stock to use for orange-trees, orange or lemon? The question caused a lot of discussion.

Mr. J. HUMBLE thought that lemon stocks would be best for shallow soils with a clay subsoil, as he considered the lemon would stand more hardships than the orange. He did not think the orange would live long on that class of soil.

Mr. T. J. MARTIN drew attention to an orange-tree in the district which is 40 years old, stating that it was growing in about 9 inches of soil with a clay subsoil; in his opinion the orange would stand just as much hardship as the lemon.

Mr. S. PARISH stated that at his place some years ago, as an experiment, some orange and lemon stocks were budded with buds taken from the same tree (a seedling orange); these trees were planted side by side. The trees on lemon stocks bore a regular crop every year, whereas those on orange stocks bore a heavy crop one year and only a very light crop the following year; but the fruit on the latter was far superior, both in appearance and flavour, and the trees were not affected with the scale to the same extent as those on the lemon stocks. He favoured the orange stock. The discussion closed with a majority in favour of the orange stock.

DEPARTMENTAL NOTE.—An answer to the first of the above questions is provided by the article "Fungus and other Diseases of Citrus Trees" in this issue.

An experiment plot of potatoes has been planted at Martin's Creek by an officer from the Department of Agriculture, which will be watched with interest by the farmers in the neighbourhood.

At the annual meeting of the branch, on 1st October, the Secretary's report showed that twelve meetings were held during the year, at which papers were read by members, demonstrations and a lantern lecture given by officers of the Department, and many useful and instructive discussions took place. From the Department of Agriculture a case of insect specimens was received, the greater number of which were to be found locally; the collection would be valuable in enabling members to distinguish between useful and harmful insects.

Copies of the *Agricultural Gazette* for every member and of many other publications were received from the Department, and in response to a request on the subject, farmers' experiment plots had been planted with various crops for the purpose of demonstrating the best methods of cultivating and manuring. The membership at the end of the year was forty-one, and the subscriptions totalled £4 2s., while the expenditure amounted to £2 6s. 9d., leaving a credit balance of £1 15s. 3d.

Mittagong.

The regular monthly meeting of this branch was held on 3rd October. Three new members were enrolled. The members discussed "Cross-fertilisation of Fruit Trees."

Moruya.

A lecture on "The Diseases of Pigs" was delivered at Moruya on 23rd September, by Mr A. E. Massy, M.R.C.V.S. Mr. Massy dealt very fully with his subject, explaining carefully the paralysis in hind-quarters, kidney worm, and pneumonia, which are amongst the most common ailments of pigs. He advised farmers to pay particular attention to the proper housing and feeding, which were two important items that often received careless handling. In the course of his remarks, Mr. Massy mentioned that swine fever had become extinct, but still he advised farmers to isolate pigs on getting them from other districts.

The Secretary reports that the subject of the lecture was very appropriate, as pigs are now raised extensively throughout the Moruya district, where some fine quality Berkshires can be seen.

Narellan.

The monthly meeting of the branch was held on the 4th September, when Mr. A. P. Cunning read a paper that provoked a good deal of discussion, and from which some extracts are made :-

MODERN AGRICULTURE AS APPLICABLE TO THE NARELLAN DISTRICT.

Mr. Cunning discussed the production of hay and chaff, stating the four main essentials to be fair land, good rainfall, modern machinery, and a mixture of patience, knowledge of the work, and backbone. After dealing with the last heading, he proceeded as follows :—

You must fallow for two special reasons. First, it enables you to conserve rainfall in the subsoil; second, you can shallow plough and drill a great deal more fallowed land when it comes to the planting season than if you had to start your main ploughing at that time; there is a third reason, and that is that your worked up fallow land is perfectly clean and free from all weed growth Drilling gives the crop the advantage of being fertilised at the one operation. By drilling your seed you place it down in the moist soil which will germinate it more evenly than a fall of rain will—it practically germinates in a "hot-bed." Drilling also places the seed beyond reach of the birds, and later in the season, should a dry spell occur, you will find your drilled crop will not be affected, because its roots are down under in the moist soil. A drilled crop will grow more evenly right on to harvesting time Drilled seed also permits of more heavy harrowing of the growing crop than ever hand-cast seed would; in fact hand-cast seed is often placed at such a shallow depth that it is impossible to harrow the growing crop at all, and in cases like this every dry spell of weather that comes along will dry off or check the growth of your crop. A drilled crop on fallow land is always started off on a sound foundation. If possible drill in the seed in April, and hope that no rain may fall on the sown areas for six weeks; every shower after March robs the seed-bed of its summer heat, which is so essential to quick germination. Three weeks after the first appearance of the young plant you may start harrowing, and from then on till the crop is a foot high you will do well to keep on harrowing every week or fortnight, granted always, of course, that the ground is not in a wet state. It is best to harrow the crop just when the ground will crumble nicely under the harrows; this will keep the evaporation of moisture down to a minimum. Encourage as much moisture as possible to pass from the subsoil through the plant, and if you find by harrowing the growing crop it is possible to keep an inch or two of fine loose mulch on top, you will have shut down under, imprisoned, a lot of moisture which will be of immense benefit to the crop through all stages of its growth. This will to a great extent overcome any dry spells of weather, or minimise the bad effects of the very drying winds we often get in the late winter and early spring. Don't neglect to fertilise your crops; costing about 2s. 6d. per acre only, it is a cheap insurance against failure. Employ a reaper and binder to harvest the hay;

you can have sheaves stooked up as soon as cut, and if they are well stood up, it takes a heavy rain to get into them. You can cart sheaf hay quicker than loose. Once a farmer has had his hay crop cut by a binder, he doesn't revert to the mower. Employ all up-to-date machinery and good methods, and you will be surprised to find how much of the old-time drudgery has gone out of farming; it is a clean, natural, healthy life, and you will find it not only a very interesting occupation, but also a more profitable one.

Nimbin.

At the meeting of this branch on 1st August, an interesting discussion took place on Mahona cane *versus* wheat, vetches, and oats. Some of those present preferred Federation wheat, while others believed in Thew and Bobs, but it was considered that a definite opinion could not be formed, as the varieties had not been tried in the district to any great extent. Mr. R. H. Greene contended that, for a man with a large herd, it was almost impossible to cultivate enough land to grow sufficient green feed to last through the winter, and therefore Mahona cane was one of the best crops to grow, as it yielded heavily.

There was also a discussion on pigs. Some believed in a strain of Tamworth in the boar and a pure Poland-China sow. They considered that the pure Tamworth ate too much. It was contended that Tamworth and Poland-China had good litters, but, all things considered, the Berkshire was hard to beat.

On 29th August a discussion took place on corn-planting, the consensus of opinion being that planting corn wide apart between the rows and thickly in the rows, produced a much better yield than planting the rows close together and thinly in the rows. Early corn at Nimbin did not produce very satisfactory results, as it often required rain when the weather was dry, and it was more subject to weevil. Yellow Dent and Red Hogan were considered the best varieties to grow in the district. *Saccharum officinarum* was praised by members.

At the meeting on 3rd October, opinions were exchanged regarding Rhodes grass. Some members considered it was inadvisable to run a fire over it, but one member reported that he had fired his grass, and it was now coming up strongly.

Orangeville.

A paper entitled "Farmers—their weakness and their strength" was read by Mr. L. Williams at the September meeting.

Orchard Hills.

A lecture on poultry farming was delivered by Mr. J. Hadlington, Poultry Expert, to members of this branch on 30th September. There was a good attendance, and the Secretary advises that the lecture was highly appreciated.

Ponto.

On 12th August a lecture was given by Mr. J. W. Mathews, Sheep and Wool Expert, at Mr. H. L. Lane's woolshed, when members were much gratified at the information given.

The monthly meeting of this branch was held on 7th September, when a paper was read by the Secretary, Mr. A. D. Dunkley.

VEGETABLE GROWING FOR HOME USE IN DRY DISTRICTS.

The land should be rich and fertile, and of a good friable loamy nature, such as will not cake readily after rain.

It should be situated handy to the homestead, and should be laid out so that it can be worked with the farm machinery.

The vegetable plot should be in four sections or plots, two for summer vegetables and two for winter vegetables.

The land for the summer plots should be broken up with a mould-board plough some considerable time before any seed is to be planted; this may be done with any farm plough. The land should then be kept free from weeds, with a loose mulch. This can be done with a spring-tooth cultivator and good harrows alternately, then ploughing the land when it becomes too solid to harrow.

When the seed for the summer crop is sown on one-half, continue fallowing the other half for twelve months; then sow the fallowed half for the next year's crop, and fallow the half which had the first crop, and so on. The same method could be followed with the winter vegetable plots.

The winter vegetables may be cabbage, cauliflower, lettuce, onions, peas, radishes, carrots, parsnips, white turnips, swedes, &c. Most of these do not require much attention after sowing if the soil is well fallowed. Some of the summer vegetables are pumpkins, marrows, squashes, grammas, tomatoes, cucumbers, melons, potatoes, sweet potatoes, beans, &c. These should be sown in rows, so that they can be cultivated between the rows after the plants are up and well grown. In most cases 1 acre, 2 x 5 chains, and cultivated lengthwise, should be sufficient. In fallowing weeds must not be allowed to grow thickly and draw the moisture out of the soil, otherwise the work which has been done has lost its good effect

Redbank.

This branch held its monthly meeting on 2nd September, when two new members were enrolled.

A Boys' Potato Club has been formed under the auspices of the branch for the coming season. Prizes have been offered for (a) best yield, and (b) best cultivation.

Mr. Davy read a short paper on wheat growing under local conditions, which proved of considerable interest to members. He considered the most vital points in connection with wheat growing to be fallowing, working the fallow, sowing graded seed only, and fertilising. The varieties he recommended for the district were Yandilla King, Marshall's No. 3, and Federation. Quantity of seed per acre—early sowing, 40 lb.; later sowing, 50 lb. He also recommended the application of superphosphate at the rate of 25 to 30 lb. per acre, and dealt with ploughing, working the fallow, bluestoning, &c.

Mr. H. J. Woods, of Rockview, read a very interesting paper at the meeting on 2nd October.

POTATO CULTURE.

The varieties of potatoes from which I have obtained the best results are, Magnum Bonum, Carman, and Up-to-Date, but the grower should be guided by his own experience in selecting the variety best suited to his locality. Great care should be taken in the selection of seed. With well-shaped potatoes (not smaller than hens' eggs) planted whole, I have obtained very good results. I do not favour the cutting of seed potatoes. For the preparation of the soil I would suggest fallowing during the early autumn, ploughing 4 to 6 inches deep. Harrow as soon as ploughed (to conserve the moisture), and follow at later intervals with shallow cultivation—cross and skew harrowing. Planting should commence during the first week of November, and may be continued till about the 20th December. Plant the sets from 4 to 5 inches deep in rows 26 inches apart; distance between sets, 12 to 15 inches. After the potatoes appear well above ground, I recommend harrowing but do not favour hilling, especially in a dry season. The harrow cultivator is a good implement for working between the rows. Great care

should be taken by growers in the preparation of their potatoes for market. The tubers should be free from dirt and put in new bags, well filled and neatly sewn. In my opinion the bags should be branded with the grower's name and address.

St. John's Park.

At the monthly meeting of this branch on 26th September, Mr. Gava delivered a lecture on vine grafting. In the course of his remarks he explained that there were two styles of grafting generally used — the "whip" for small plants, and the "wedge" for others, but in each case it was necessary to have the barks closely joined at least on one side. The resistant stocks were non-bearing but phylloxera proof. The cuttings from the pruning, intended for use as scions, should be buried flat, but not in too large a heap, so as to allow the earth to get around each cutting. Mr. Gava's experience has been that grapes grown on an easterly slope sheltered from westerly winds were the sweetest, while those grown on flats were larger but watery. In reply to questions, he said that the stocks best suited for the district in question were Riparia x Rupestris 3306, and Aramon x Riparia 143.

Taralga.

The usual monthly meeting was held on Monday, 28th September. Messrs Marmont and Dawson have presented the branch with a handsome notice board, which will be very useful as an advertising medium.

A Boys' Potato Club has been formed under the auspices of the branch, and the work is likely to interest a number of boys

Tatham.

A new branch has been formed at Tatham, with twenty-two members to commence. Mr. J J. Riley will act as Honorary Secretary.

Temora.

This branch held its monthly meeting on 12th September, when the following paper was read by Mr. J. T. Warren :—

WHITE FUNGUS, OR POWDERY MILDEW OF WHEAT.

I have given the subject under notice a good deal of attention during the last seven years, and in January last called the attention of farmers, by an article in the Press, to the serious nature of the disease. The reason I did so was that I found its bad effects on last year's wheat were generally attributed to either frost or drought. The disease is by no means a new one, for looking back to days when I was still ignorant of its nature and appearance, I can easily pick out certain isolated seasons when crops had the same general appearance and also the same disappointing results. It is evidently not peculiar to these districts, for last year I had an opportunity of seeing the farms in a part of Southern Riverina just after harvest, when I found unmistakable signs that the crops there were also so affected; and, although that district was blessed with good rains in the spring, which caused an abundant growth of straw with the promise of heavy yields, crops which promised from 24 to 30 bushels actually produced only 10 or 12 bushels. An oat crop near Melbourne, which yielded unexpectedly light, showed the amber colour in the lower part of the straw, peculiar to crops affected by this fungus, when the growth is heavy.

As to a remedy, I had satisfactory results from feeding-off with sheep last year, and this season am treating a much larger area in a similar way: and I think, so far, with good results. The disease makes its appearance at very different periods—last year in early July, this season in early June. Formerly, I always found it about September. From this we see that feeding-off is not always practicable, unless as a preventive. Calm, pleasant weather seems to favour the disease. On the other hand, a few days of either cold or hot wind seem to arrest its development. I am inclined to think that a loose

condition of the surface soil may favour the fungus growth. The loss from this cause this season will be great, as the dry weather is at present testing the hardiness of all crops, and the fungus-affected ones are unequal to the test.

Mr. Warren held the opinion that the disease is rarely thrown off until it has considerably reduced the yielding power of the plant. He estimated that the average annual loss through the disease during the last seven years was not less than 3 bushels per acre. In reply to a question from Mr. Mallinson, Mr. Warren stated that sometimes crops are affected in certain portions of an area only, but very commonly the whole area of a paddock was affected to a greater or lesser degree.

In response to a request from the branch, the Biologist of the Department has furnished a life history of Powdery Mildew (*Erysiphe graminis*), as follows :—

LIFE HISTORY OF POWDERY MILDEW (*Erysiphe graminis*).

This fungus forms on the leaves and stalks of the wheat certain white or pink patches, more or less extended and of varying thickness. Some of the fungus threads or hyphæ turn almost vertically outwards and bud off from their ends small cells; these become completely obstricted, as spores, in vast quantities, and appear as a fine white dust when the plant is shaken. These spores germinate readily and spread the disease, and also diffuse easily. This stage of the fungus appears early. The fungus is often of a reddish-grey appearance and is sometimes mistaken for rust As summer approaches it forms a greyish-white thick felt on the leaves, and in this condition numerous little brown or black spore-cases can be seen with the naked eye. Within a week or so after the spore-cases have begun to appear, the leaves that were covered by the mildew felt die, and at length the felt drops off. Within the spore-cases, when cracked open and examined under the microscope, are to be found a number of little sacs (asci), each containing, when mature, eight spores (ascospores). It is these spores that carry the fungus forward from year to year, as they are capable of resting for a period without germinating.

At a meeting of the branch on the 3rd October, correspondence was read from the Department conveying the above information, together with a statement that specimens of diseased wheat which had been forwarded a few weeks before had been found to be strongly marked with *Erysiphe graminis.*

United Peel River

The monthly meeting of this branch was held at Woolomin on 5th September, when five new members were enrolled, making the total up to forty members.

Bulletins on agricultural subjects sent by the Department to form the nucleus of an agricultural library, were greatly appreciated, and members were invited to apply through the Secretary for any of special interest to them.

An illustrated lantern lecture was given by Mr. R. G. Warry on the night of 2nd September.

BEE-FARMING

The lecturer explained that the subject could be touched on in many special portions, but this being his first visit, he would begin with the elementary knowledge required by the amateur. The site, construction, and position of the hives, and approximate initial cost for, say, fifty hives were touched on. As in all other industries, it was necessary that the foundation stock should be good, and the first consideration was a good queen. By means of excellent lantern slides, the vagaries of life inside the hive were shown. Swarming—that troublesome portion of apiculture—was often hereditary; but science had been able to reduce the tendency in a few simple ways. The rearing of young queens was dealt with, the lecturer stating that it would be of profit to apiarists to make a study of this portion of the industry. Several of the enemies of the hive were illustrated, together with the general symptoms of their presence in the hive. It was necessary to be very watchful against that common disease "foul brood," and bee-farmers were advised to burn all portions of diseased hives which could not be disinfected or were not worth such treatment. The types of hives recommended, wax presses, and a few well-established apiaries in other parts of the State were also illustrated.

Orchard Notes.

W. J. ALLEN.

NOVEMBER.

Cultivation.

EXPERIENCE in the past has fully demonstrated the necessity for regular cultivation during the early summer months. This applies not only to summer fruit, but to citrus trees as well. The tools necessary to bring the land into a good tilth must vary according to the climate and soil in which the orchardist is working. It may be necessary to plough in many Tableland orchards, whilst cultivation with spring-tooth implements will serve the same purpose in the drier and flatter country. A soil mulch should be the aim of the orchardist, and it is becoming more generally recognised that a friable loose surface keeps the moisture down below the point where evaporation readily takes place. It is difficult in some of our coastal orchards to get a good deep soil mulch, so that the cultivator requires to be kept moving frequently. Cultivating frequently, and thus working the soil fine, has the objection that in some orchards the surface will wash readily. To avoid this, provision should be made for surface drains to carry away extra heavy falls of rain.

Summer Thinning.

The work of pruning or cutting out some of the excessive growth in young vigorous trees that interferes with their best development, may be carried out at the present time. Both the Coast and Tableland districts contain orchards where the thinning is necessary; but it should only be entrusted to capable hands, as injury may be done to trees if judgment is not exercised. The work of summer pruning or training (thinning) is really done for the purpose of removing superfluous shoots throughout the centre of the trees, more especially where the vase-shape is desired. In growing and training fruit trees that bear their fruit on two-year-old spurs and older, the first few years of their life are devoted to branch and stem formation. During the winter pruning the framework of the tree is arranged for, and the resultant spring and summer growth is very often excessive and misplaced, as well as crowded. It is then necessary to remove any superfluous growth that is likely to crowd the centre and shade the buds that would develop into fruit spurs. Outside shoots are usually left untouched, as the hot winds and sun are liable to cause burning and stunting if too much exposure is permitted. The cutting back of any shoots should be to about an inch or so, taking care to retain the basal leaves and the leaf against the bud cut to. Don't cut back shoots that have a fruit bud developing at the point, as in the case of Jonathan apples.

It is not necessary to cut back the leaders or main shoots; but if there are two or three strong growths alongside the leaders that are not required for shaping, these may be cut clear away. By doing this the body of the tree is

allowed more light for the development of fruit buds along the large main branches. Don't cut back shoots on trees that are weak or stunted, but only on vigorous, strong-growing trees. A look-out should always be kept for suckers at the base of trees and vines. Any of this class of growth should be removed without delay.

Pruning.

Citrus trees may now be pruned ; all dead wood should be cut out, and any weak or dying twigs throughout the centre of the trees removed. Where large branches are taken off, the cuts should be painted with a thin white lead paint. The pruning and manuring of passion vineyards should be carried out without delay.

Irrigation.

In the orchards where irrigation is practised, a thorough watering should be given to all trees towards the end of the month. This may be the second watering of the season. The utmost care should be taken to keep the water confined to the furrows, as wherever the land is flooded it is likely to become hard. As soon as the furrows are dry enough to work, cultivate the orchard twice, and loosen the soil around any young trees with a fork hoe.

Codlin Moth.

The provisions of the Fruit Pests Act should be observed in connection with this pest. Spraying with arsenate of lead will be found to give excellent results. Thorough spraying of the fruit and foliage is necessary, so as to leave no chance of breeding for late broods. An inspection of the fruit should be made at regular intervals, and all affected fruits removed. This is a splendid means of keeping moth under complete control, in conjunction with spraying.

Scale Insects on Citrus Trees.

Red and other scale insects of the citrus trees should receive attention. Fumigation is still the most thorough method of eradication. Tables of dosage charges, &c., may be obtained by applying to the Department Miscible spraying oils are coming into use for scale insects on citrus trees, but great care should be exercised with such spraying materials, as there is a liability to cause burning of the branches. Extra care should be taken in fumigating and spraying weak trees or trees suffering from the effects of drought.

Grafts.

These should be regularly attended to. In some cases where the young grafts are growing rapidly, the top growing shoots should be nipped to prevent blowing out, and to allow of a thickening of the stem. The grafts should be kept well disbudded, removing all shoots and buds below the graft.

Thinning the Fruit.

During the month, apricots, plums, and peaches, as well as early apples, will require thinning where the fruit has set too heavily. The practice of thinning fruit has not yet been given the attention it deserves. On inspecting most fruit trees at this time, where the fruit has set heavily, it will be found that there is a certain proportion of badly-developed specimens and twin fruits, as well as fruits which are insect-marked and limb-rubbed. If the orchardist

removes these, as well as thinning out clusters, allowing a space of, say, 2 to 4 inches between each fruit, it allows for the better development of the remaining specimens. There is no hard-and-fast rule; the orchardist must use his judgment as to the quantity each tree should be allowed to carry. The age of the tree, the soil, variety, &c., are all factors which have to be taken into consideration.

Drying Racks.

Many of the larger growers are not now drying their currants, sultanas, and lexias on trays, but on racks made of wire netting, supported on timber staging.

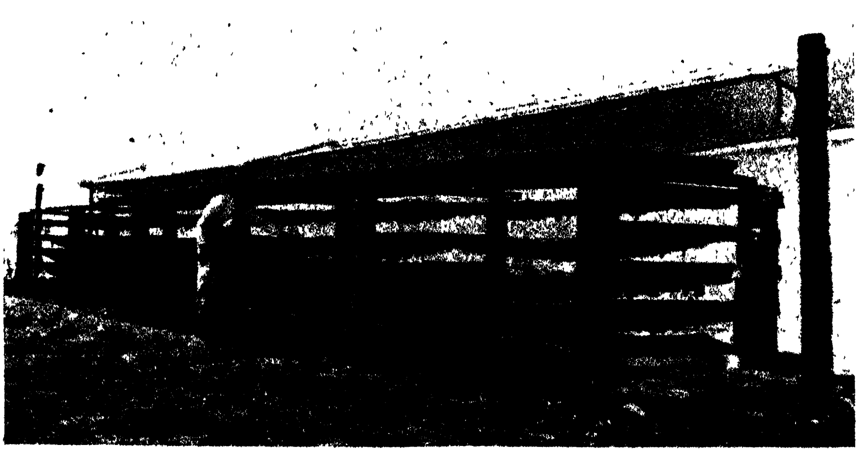
The general principles are to erect a substantial hardwood staging, and stretch from five to ten layers of 2-inch mesh netting 12 or 14 inches apart. Some growers are experimenting with layers only 6 inches apart. Several methods of tightening the netting are employed, some supporting it on longitudinal wires, others having wooden rollers at the ends, and others again providing a network of wood underneath so as to divide the netting into sections the size of trays.

Hessian is spread on the ground beneath the racks, and when the currants are dry they are rubbed through the netting and fall on the hessian.

The racks are generally provided with supports for a movable canvas roof as a protection against bad weather, but some are building permanent iron roofs, as they consider shade-drying preferable to drying in the open sun.

A rack costs about one-third of the amount required to purchase trays to hold the same quantity of fruit. There is a great saving in labour in stacking and unstacking trays. Growers state that they get a very much better sample, though the fruit takes a few days longer to dry.

Growers who intend trying this method of drying should make all necessary arrangements to have the racks well in hand before the picking season commences. The accompanying illustration will show the general plan of the rack.



A drying rack for currants, sultanas, and pudding raisins.

Department of Agriculture, Sydney, 2nd November, 1914.

To stand the season at Hawkesbury Agricultural College, Richmond, the Pure-bred Imported Clydesdale Stallion,

ROYAL WARDEN (16045) C.S.B.

Royal Warden is a rich bay, showing good quality, combined with substance. He possesses an excellent temper. He was imported in 1912, from Scotland, by the Government of New South Wales. Bred by James Merson, Craigwillie, Huntly, Aberdeenshire. He was awarded first and champion prizes at the Royal Agricultural Show, Norwich, England, 1911.

Sire: Everlasting (11331) C.S.B.
1st Dam: Gem of Craigwillie (21597) C.S.B., by Prince Thomas (10263) C.S.B.
2nd Dam: Lady Edith of Craigwillie (15687) C.S.B., by Prince of Carruchan (8151) C.S.B.
3rd Dam: Jean of Northfield (18564) C.S.B., by Star of the North (2435) C.S.B.
4th Dam: Cowden Jean (19435) C.S.B., by Clydesdale Jock (1415) C.S.B.
Foaled 15th April, 1908.

Fee: Five guineas per mare, or any number over two from the one owner, at £4 4s. each.

By arrangement with the Principal, a limited number of mares may be taken at agistment at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE PRINCIPAL,
Hawkesbury Agricultural College,
Richmond, N.S.W.

To stand the season at Wagga Experiment Farm, the Imported Pure-bred Stallion,

CLANDALE (14628) C.S.B.

Clandale is a beautiful bay horse of substance, and most exceptional quality. He possesses the best of legs and feet. He was bred by Wm. Cochrane, Port Logan, Wigtonshire. He was awarded first prize at Aberdeen Show, Scotland, 1912.

Sire: Allandale (12418) C.S.B.
1st Dam: May Logan (21199) C.S.B., by Prince Robert (7135) C.S.B.
2nd Dam: Haidee (21198) C.S.B., by Prince of Wales (673) C.S.B.
3rd Dam: Jess of Portlogan (3145) C.S.B., by Lofty (460) C.S.B., by Hercules (378) C.S.B.
4th Dam: Kate.
Foaled May 10th, 1907.

Fee: Five guineas per mare, or any number over two from the same owner, at £4 4s. each.

By arrangement with the Manager a limited number of mares may be taken at agistment at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE MANAGER,
Experiment Farm, Bomen, Wagga Wagga.

To stand the season at Cowra, the Pure-bred Clydesdale Stallion,

ROBIN ADAIR (16013) C.S.B.

Robin Adair is a big upstanding horse of great substance. He shows good character and good temper. He was bred by Thos. Lean, Wester Deans, Leadburn, and was selected by the Clydesdale Association to represent the breed at the Olympia International Horse Show. He was imported in 1912 by the Government of New South Wales.

Sire: Royal Walter (13717) C.S.B.
1st Dam: Rossie (19808) C.S.B., by Alexander Everard (14242) C.S.B.
2nd Dam: Bell of Western Deans (14652) C.S.B., by Prince of Brunstone (9977) C.S.B.
3rd Dam: Darling of Wester Deans (14651) C.S.B., by Top Knot (6360) C.S.B.
4th Dam: Blossom of Wester Deans (14649) C.S.B., by Stonelaw Lord-Lyon (2400) C.S.B.
5th Dam: Bell of Westside (23030) C.S.B., by Pride of Kyle (3904) C.S.B.
Foaled May 30th, 1909.

Fee: Five guineas per mare, or any number over two from the one owner, at £4 4s. each.

By arrangement with the Manager, a limited number of mares may be taken at agistment, at local rates. Good secure paddocks, but no responsibility incurred.

For further particulars, apply to— THE MANAGER, Experiment Farm, Cowra.

E

Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull.	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn ...	Melba's Emblem (183 M.S.H.B.)	Emblem of Darbalara (100 M.S.H.B.)	Melba 3rd of Darbalara (1058 M.S.H.B.)	Berry Farm ...	‖
" ...	Imperialist ...	Florio	Lady Nancy of Minembah.	Berry Farm ...	*
" ..	The Irishman (imp.)	Tipperary Bull	Colleen Bawn (imp.)	Robertson ..	17 Mar., '15.
Jersey ...	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Yanco Farm ...	*
" ...	Trafalgar ...	Best Man ...	Rum Omelette	Cowra Farm ...	*
" ...	Kaid of Khartoum	Sir Jack ...	Egyptian Belle	H. A. College ..	*
" ..	Leda's Retford Pride.	Dinah's Lad .	Leda's Angel..	Wagga Farm ...	‖
Guernsey ...	The King's Mirror	Calm Prince ...	Vivid (imp.)...	South Kyogle ...	15 Feb., '15.
" ...	Star Prince ...	Calm Prince ...	Vivid (imp.)...	Casino	— April, '15.
" ...	Sky Pilot ...	Prince Souvia ...	Parson's Red Rose (imp.).	Maclean	11 Jan., '15.
" ...	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (6509)	Inverell	— April, '15.
" ...	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	‖
" ...	Claudius (imp.)	Golden Star II..	Claudia's Pride (imp.).	Murwillumbah ...	1 Jan., '15.
" ..	George III ...	King of the Roses	Calm 2nd ...	Wollongbar Farm	‖
" ..	The Peacemaker	Calm Prince ...	Rose Petersen	Wollongbar Farm	*
" ..	King of the Roses	Hayes' King ..	Rosey 8th (imp.).	Pambula	31 Dec., '14.
" ..	Lauderlad ...	Laura's Boy ...	Souvenir of Wollongbar	Mullumbimby ...	6 April, '15.
" ...	Belfast	King of the Roses	Flaxy 2nd ...	Tyalgum	28 Nov., '14.
" .	Royal Preel ...	Itchen Royal ...	Hayes' Lily du Preel (imp.).	Tyalgum	30 Jan., '15.
" ..	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Frederickton ...	25 Mar. '15.
" ...	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	Paterson-Vacy ..	11 Mar., '15.
Ayrshire ...	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose...	Grafton Farm ..	*
"	Wyllieland Bright Lad (imp.)	Wyllieland Gleniffer (7229)	Wyllieland Sangie	Glen Innes Farm..	*
" ..	Isabel's Majestic	Majestic of Oakbank.	Isabel of Gleneira.	Grafton Farm ..	‖
Kerry... .	Rising Sun ...	Bratha's Boy ..	Dawn ...	Bathurst Farm	*

*Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed.
‖ Available for special service where stationed upon application to the Under Secretary.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1914.

Society.	Secretary.	Date.
Tweed River Agricultural Society (Murwillumbah)	A. E. Budd	Nov. 11, 12
Mullumbimby A. Society	W. A. Davis	,, 18, 19
Lismore A. and I. Society	T. M. Hewitt	,, 25, 26, 27

1915.

Society.	Secretary.	Date.
Gosford and Brisbane Water A. and H. Association	H. J. Gates	Jan. 15, 16
Albion Park A., H., and I. Association	M. A. Brown	,, 20, 21
Kiama A. Association	G. A. Somerville	,, 26, 27
Wollongong A., H., and I. Association	W. J. Cochrane	,, 28, 29, 30
Berry A. Association	S. G. Banfield	Feb. 4, 5
Wyong A. Association	C. R. Seabrook	,, 5, 6, 7
Moruya A. and P. Society	H. P. Jeffery	,, 10, 11
Shoalhaven A. and H. Association (Nowra)	H. Rauch	,, 10, 11
Newcastle A., H., and I. Association	E. J. Dann	,, 10 to 13
Central Cumberland A. and H. Association (Dural)	H. A. Best	,, 19, 20
Dapto A. and H. Society	J. H. Lindsay	,, 23, 24
Guyra P., A., and H. Association	P. N. Stevenson	,, 23, 24, 25
Campbelltown A. Society	F. Sheather	,, 24, 25
Manning River A. and H. Society (Taree)	L. Plummer	,, 24, 25
Gunning P., A., and I. Society	J. R. Turner	,, 24, 25
Tumut A. and P. Association	T. E. Wilkinson	Mar. 2, 3
Uralla A. Association	H. W. Vincent	,, 2, 3, 4
Tenterfield P., A., and M. Society	F. W. Hoskin	,, 2, 3, 4
Bega A., P., and H. Society	H. J. B. Grime	,, 3, 4
Braidwood P., A., and H. Association	L. Chapman	,, 3, 4
Gloucester A., H., and P. Association	G. E. Furness	,, 3, 4
Camden A., H., and I. Society	A. Thompson	,, 3, 4, 5
Berrima District A., H., and I. Society (Moss Vale)	C. E. Wynne	,, 4, 5, 6
Glen Innes & Central New England P. & A. Assoc'n	G. A. Priest	,, 9, 10, 11
Coramba District P., A., and H. Society	H. E. Hindmarsh	,, 10, 11
Tumbarumba and Upper Murray P. and A. Society	E. W. Figures	,, 10, 11, 12
Nepean District A., H., and I. Society (Penrith)	P. J. Smith	,, 11, 12
Gundagai P. and A. Society	A. Elworthy	,, 16, 17
Mudgee A., P., H., and I. Association	P. J. Griffin	,, 16, 17, 18
Cobargo A., P., and H. Society	T. Kennelly	,, 17, 18
Inverell P. and A. Association	J. McIlveen	,, 17, 18, 19
Wallamba District A. and H. Association (Nabiac)	T. R. Dun	,, 18, 19
Goulburn A., P., and H. Society	G. G. Harris	,, 18, 19, 20
Quirindi P., A., and H. Association	H. H. Rourke	,, 23, 24
Batlow A. Society	C. S. Gregory	,, 23, 24
Luddenham A. and H. Society (Wallacia)	F. S. Leggo	,, 23, 24
Molong P. and A. Association	W. J. Windred	,, 24
Warialda P. and A. Association	C. O'C. Murray	,, 23, 24, 25
Bangalow A. and I. Society	W. H. Reading	,, 23, 24, 25
Macleay A., H., and I. Association (Kempsey)	E. Weeks	,, 24, 25, 26
Upper Hunter P. and A. Association (Muswellbrook)	R. C. Sawkins	,, 24, 25, 26
Dorrigo A., H., and I. Society	W. R. Colwell	,, 24, 25
Crookwell A., P., and H. Society	J. H. Huxley	,, 25, 26
Eastern Dorrigo District A., H., and I. Society (Ulong)	T. B. Timms	April 5
Adaminaby P. and A. Association	W. Delany	,, 7, 8
Orange A. and P. Association	W. J. I. Nancarrow	,, 21, 22, 23
Dungog A. and H. Association	C. E. Prout	,, 28, 29

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VOL. XXV. PART 12. DECEMBER 2, 1914.

Agricultural Gazette of New South Wales.

The Cultivation of Oats in New South Wales.

J. W. SHAW, Assistant Inspector of Agriculture.

OATS are not cultivated to the same extent in New South Wales as they are in New Zealand and Tasmania, for the simple reason that the climatic conditions and rainfall of this State are much more adapted to the growing of wheat.

The conditions which favour the successful cultivation of oats cannot be considered as altogether satisfactory from a wheat-growing point of view. Speaking generally, our best oat-producing countries have a cold climate, associated with a high average rainfall, whereas with wheat the best results are usually obtained in comparatively warm countries, with only a moderate or even a low average rainfall.

Apart from the climatic conditions and rainfall required for the successful cultivation of this crop, the demand for the grain for making oaten meal is never very strong, as this commodity is only used to a limited extent, whereas from wheat the principal food of the human race is manufactured. It is safe, therefore, to predict that oats will never be grown much more extensively in this State than at the present time.

To give some idea of the areas devoted to this crop each year, the following figures, taken from the Government Statistician's reports for the past five years, may be of interest:—

AREA under Oats in New South Wales.

For Grain.			For Hay.		
Year.	Acres.	Production. bushels.	Year.	Acres.	Production. tons.
1909	59,881	1,119,558	1909	169,441	186,243
1910	81,452	1,966,586	1910	178,968	255,781
1911	77,991	1,702,706	1911	142,805	193,064
1912	71,047	1,155,226	1912	147,710	155,653
1913	85,175	1,674,075	1913	182,955	212,266

In addition to the above, considerable areas are also sown for green feed, particularly in the coastal districts. Of late years the area sown for this purpose on the Coast has been considerably reduced, and its place has been taken by certain varieties of wheat specially adapted for green feed and to the climatic conditions which exist on the Coast.

A small quantity of the grain is purchased for the manufacture of oaten meal, but by far the most important use is as feed for all classes of stock.

Climate and Districts.

Oats may be grown with a fair amount of success under a diversity of climatic conditions, but they thrive best in a cold climate, associated with a good rainfall that is evenly distributed throughout the crop-growing season. As previously mentioned, the climate of this State, taken on the whole, is much more adapted to wheat-growing; but in some of the colder districts oats may be grown almost to perfection. In a general way, it can be said that a good potato district will, as a rule, prove suitable for growing oats, as these crops require similar conditions of climate. As an example of this, we may take portions of the Northern Tablelands of the State. Some of our very best potato districts are situated there, and at the same time some of our best oat districts. Glen Innes, in particular, is a district where the climatic conditions are favourable to the production of potatoes and oats of the highest quality; and there are other portions of the State that are similar in their suitability for the two crops.

Speaking generally, it may be said that in districts with a lower average rainfall than 25 inches, oats are better left alone, unless the crop is being grown for some specific reason, such as on land where the previous wheat crops were affected with Flag Smut or Take-all. The value of this cereal as a remedy for checking these diseases cannot be over-estimated. It is not suggested here that oats should not be grown in districts with a lower annual rainfall than 25 inches; but as a main crop they are better left alone if the rainfall does not reach this average. New Zealand is noted for the production of oats, and the nearer the climatic conditions resemble those of the Dominion, the better will be the results obtained.

On the Northern Tablelands, the country extending from about Uralla to Glen Innes is considered highly suitable for the growing of oats. On the Central Tablelands, from Blayney to Orange is the pick of the oat country, although some exceptionally good returns have been obtained in the Bathurst district. On the Southern line, the best oat districts are situated in the vicinity of Goulburn, Taralga, and Crookwell, and in the cooler localities in other Southern districts some excellent crops have been grown. The districts mentioned can be classed as about the best for oat-growing, although excellent crops have at different times been seen in many other portions of the State. The climate of the districts referred to being colder, they are naturally more adapted for the cultivation of this cereal than other parts of the State.

Soils.

Oats may be grown successfully on soils entirely unsuited to wheat, and also on low-lying situations where it would be extremely inadvisable to plant wheat. They may be sown on land that is too strong and rich for wheat, and also upon heavy, wet soils that have a natural tendency to be cold and sour. The red basaltic soils met with in the best potato-growing districts produce excellent crops of oats; but the crop will do well on practically any soil, provided it is worked into good tilth previous to planting and the

rainfall is not too low. Oats lend themselves to conditions entirely unsuitable to the growth of other cereals. Varieties of the Potato or Tree type generally give the best results on the richer lands, while those of the Tartarian or Side-bearing type appear to be very suitable to the lighter soils.

The Preparation of the Land.

Land intended for oats should be prepared in a similar manner to that intended for wheat, except that in the more favoured oat districts slightly deeper ploughing may prove advantageous. In the drier districts fallowing is essential to obtain the best results; and, in regard to the time the operation should be commenced, the same general remarks apply as to wheat, and the implements to use for working the fallow are also the same. Clean cultivation paddocks are very necessary in the growing of prime oaten hay, as nothing detracts so much from its general appearance when placed on the market as the presence of weeds, thistles, burrs, &c. When oats are grown for green feed on the Coast, the land should always be prepared early, say, about two months prior to sowing, provided, of course, the weather conditions will permit. It is wonderful how great is the effect on the resulting crop of a short fallow. A good, moist seed-bed is absolutely essential for the reception of the seed, and every farmer who wishes to obtain the best results with this crop must do all in his power to bring this about by stringent methods of cultivation before planting.

When to Sow.

This will depend upon a number of factors, the chief being the object of the grower—whether for green feed, hay, or grain—the district, and the season of the variety it is intended to sow. For green feed on the Coast, oats should be sown in February and early March, as the variety which has so far given the best results under coastal conditions, viz., Algerian, is a slow grower, and if not sown very early will not be at its best to cut for green feed when dairymen require it most, which is during the months of July and August. On the Tablelands and in many of the larger wheat districts it has been a common practice not to sow oats until the planting of the wheat is completed; but when we consider that our best all-round variety (Algerian)—the one undoubtedly most universally grown in this State—has a rather long-growing season, it can be understood that such a practice is not a good one, if the best results are to be obtained. Like wheat, the longer the growing season of the variety, the earlier should the sowing be done, and *vice versa*.

In some districts the farmers sow any oats they intend growing as early as in the first and second week in March, before the wheat planting commences. In individual localities the circumstances will be altered, but for the majority of districts in this State, Algerian oats should be sown between the last week in March and the last week in April, for both hay and grain.

If sown before this, and the weather conditions are very favourable to growth, they may grow too rank, and are apt to lodge unless the growth is

checked by feeding-off. From a hay point of view, very early sowing has a tendency to induce a heavy growth of flag, which in wet seasons may turn brown, and much detract from the quality of the resultant crop.

Selection of Seed.

Oats for seed should be obtained from a reliable source, and only sound, plump grain, preferably graded, should be sown. As the cultivated oat is supposed by some to have originated from the Wild Oat (*Avena fatua*), many farmers are of opinion that they throw back to the original wild strain. This argument is sometimes advanced by farmers as the reason why black oats are so prevalent in wheat paddocks throughout the wheat belt; but there are scores of instances where wheat paddocks are over-run with this pest, though oats have never at any time been sown in them. Farmers need have no fear that by growing oats in their wheat paddocks they are likely to introduce black oats on to their farms, unless, of course, the seed contains seeds of that pest.

It is a well-known fact that acclimatisation is a very important factor in selecting wheat for seed purposes; but it does not appear to be of such importance with oats. It has been found that seed imported from a cool district to a hot one will, as a rule, give much better results than seed selected in the hot district each year. Better results might naturally be expected from the imported seed the first year; but even after being grown in the district for only one year, the seed does not give better returns than seed freshly imported direct from a cold district. This has been most apparent from a hay point of view. It has also been noticed that seed imported from a cool district into a hot one has a tendency to vary in colour, the inclination being to turn paler. This has been particularly noticed with Algerian oats. The husk, too, is affected by the climate, being usually much thicker on oats grown in a moist district than in the same variety grown in a dry one. From the above remarks it will be seen that climatic conditions have a very marked influence on the nature and general quality of the grain.

Treatment of the Seed for Smut.

Many farmers labour under the impression that there is no necessity to pickle oats previous to planting; but this idea is a very wrong one, and has absolutely no foundation. If the crop is sown for green feed, pickling is unnecessary; but if it be intended for hay or grain, the seed should always be pickled, otherwise there is a great risk of smut appearing in the crop. Some farmers will argue that a little smut in the hay is of no consequence; but smutty heads always detract from the appearance, reduce the value from a feeding point of view, and if the infection is serious, lower the prices obtained on the market. Cases have been reported where stock have actually refused to eat hay that has been badly smutted.

The same remarks apply to the grain. Large quantities of oats are purchased to feed racehorses and animals doing fast work, and trainers

and agents authorised to buy will not touch grain that contains smut in any quantity. It will thus be seen that methods of prevention must be employed if a clean crop is to be harvested and top market prices obtained.

Both formalin and bluestone have proved effective fungicides; but as the former requires much more careful handling, and is somewhat risky under certain conditions, farmers are advised to use the bluestone and lime-water treatment recommended for pickling wheat. The strength used for wheat may also be used for oats, and the same general method followed in every way, except that it is advisable to allow the seed to remain in the pickle a little longer than in the case of wheat. The reason for this is easily understood when it is pointed out that the spores of Loose Smut of oats (unlike Stinking Smut or Bunt of wheat) are blown about by the wind before all plants have formed their seed; the result is that some of these spores often find their way between the scales, which ultimately clasp the seed firmly, and any fungicide that merely wets the outside of the grain may not reach the enclosed spores. Hence any treatment of the seed, to be effective, must be sufficiently prolonged to allow the solution to reach the spores which have been enclosed beneath the hull of the cat.

If the seed is treated in a chaff bag, constant agitation whilst in the bluestone is very necessary to ensure thorough wetting of all the grain. Owing to the different formation of the seed, oats take considerably longer to dry than wheat, more particularly if lime-water is used after the bluestone. The quickest method of drying is to spread the seed out on a piece of canvas or a tarpaulin, which is raised from the ground on a stand, so as to allow of a free current of air underneath the cloth. It will be found that the seed will dry much quicker in this way, and that there is much less risk of stones, sand, or grit of any description getting mixed with the seed.

Varieties.

There are a great many different varieties of oats, and they may be roughly classified into three main types, as follows: —

(1) Those resembling Algerian, having open, branching panicles, with long, thin, light-brown or dun-coloured grains, purplish straw, and flowering glumes adhering to the grain.

(2) Those of the Potato or Tree type, having open, branching panicles, with whitish straw, short, plump, white grains, to which the flowering glumes do not adhere.

(3) Those having contracted, one-sided panicles, with long, thin, white grains, commonly known as "side-bearers."

Illustrations of typical oats of these three classes accompany this article; but in addition to the above we have certain other types, which have open branching panicles of the Tree type, with grain very similar to those of the side-bearing type; so that it is rather difficult to classify all the different types correctly. Of all the varieties tried, those given under the three

different headings are likely to succeed best under the conditions of this State. They are as follows:—

Algerian Type.—Algerian, Calcutta, Red Rust-proof, Guyra, Ruakura.

Potato or Tree Type.—Hutchinson's Potato (the best of the Potato oats), Abundance, Big Four, Sunrise.

Tartarian or Side-bearing Type.—White Tartarian; this is the only variety belonging to this class that is worth growing.

The following characteristics of the different varieties may prove helpful in selecting varieties for different conditions:—

Algerian.—This is undoubtedly our best all-round variety, and it has given the best results under practically all conditions, for green feed, hay, and grain. No other oat has proved more rust-resistant and better suited to coastal conditions, while in drier districts it has proved a great drought-resister. It may be called a profuse stooler, and usually hugs the ground for a considerable time after planting. It has fairly fine stems, and should be sown early to get the best results.

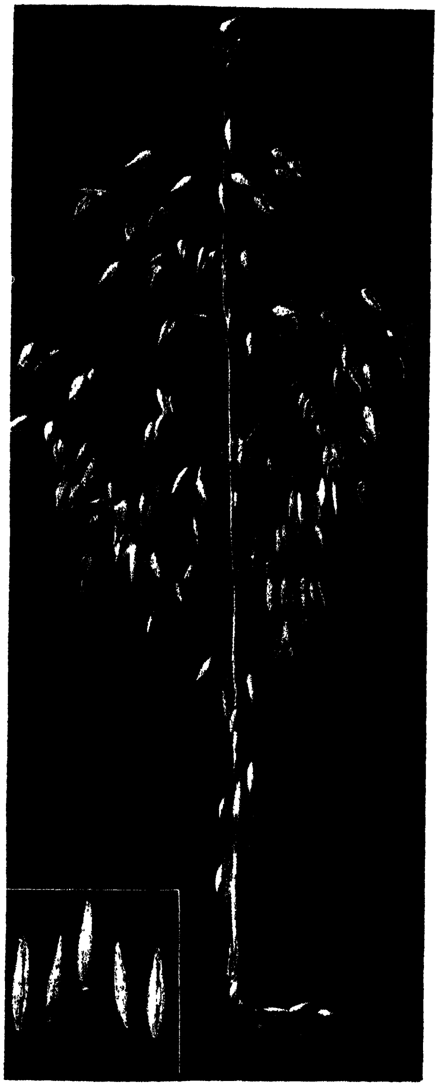
Calcutta.—This variety (which is similar to Cape, and by some considered to be the same) is largely grown in South Australia, and has given excellent results under the conditions of that State It is a few days earlier than Algerian, but it is shorter and coarser in the straw, and cannot be compared with that variety from a hay point of view. Under certain conditions it may give better results for grain than Algerian, and it would also fit into a much shorter growing season. It is not such a profuse stooler as Algerian, and the foliage is of a much lighter green

Red Rust-proof.—This is a variety very suitable to the drier districts, having given very good results in parts of Riverina and the South-western Slopes. It does not stool quite so freely as Algerian, the stems are fine, not too long, and it makes splendid rack hay It is slightly earlier than Algerian, and the grain is fairly long and brown in colour. It is a suitable variety for dry districts

Guyra.—This variety matures in about the same time as Algerian, with straw about equal in height to that variety, not too coarse, and fairly strong. It may be called a moderate stooler, has a compact head, and dark-brown grain, with a fairly strong awn, like its parent (White Ligowo). The grain is plump, and the husk fairly thin. Guyra will be found suitable to typical oat districts.

Ruakura.—This oat was imported from New Zealand, it having originated as a variation in a crop of Argentine oats at the Ruakura Experiment Farm, in the Dominion. It is claimed that it is rust-resistant, and a wonderful yielder. It has not been tried sufficiently long in this State to allow of any further comment, except that when sown beside Algerian, on the South Coast this season, it promised particularly well, and compared more than favourably with that variety from a green-fodder point of view.

Sunrise.—This is a very early oat, ripening quite a week before Algerian. The straw is usually a foot taller than that variety, and liable to lodge.



Types of Oats.

The Potato or Tree type, having open-branching panicles with whitish straw, plump white grains, to which the flowering glumes do not adhere.

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Types of Oats.

The Algerian type has open-branching panicles with long, thin light-brown or dun-coloured grains, purplish straw, and flowering glumes adhering to the grain.

The "side-bearing" type, of which White Tartarian is the best known. This has contracted, one-sided panicles with long, thin, white grains.

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though much the same as to stoutness as Algerian. It stools rather sparsely. The grain is fairly long, greyish white, with a thin husk. Sunrise is only recommended for the warmer districts, and should not be sown as early as Algerian. It occupies very much the same place amongst oats as Firbank does amongst wheats.

Big Four.—This is a rather coarse-stemmed variety, considerably later than Algerian, with white, fairly stout grain. The young growth is very procumbent, and the foliage of a very dark green. It should be sown early and fairly thickly, so as to induce fine stems. It is only a fair yielder of grain.

Hutchinson's Potato.—This is the best strain of all the Potato oats that have been tested. It is a late variety, grows about as tall as Algerian, has very coarse stems, and is not at all suitable for hay. The young growth is procumbent, and of a very dark green colour; the grain is short, plump, and white in colour. It is too coarse in the straw for hay, but the grain is much in demand for feed purposes. Buyers when purchasing oats prefer seed of the Potato type.

Abundance.—This variety is similar in season to Big Four, and the young growth also resembles that variety in appearance. It is not quite as thick in the stem, and is a very good hay oat. It is a poor yielder of grain, and can be classed as essentially a hay variety.

White Tartarian.—This is the only one of the side-bearing varieties worthy of special mention It has given excellent results on the Northern Tablelands for both hay and grain It is supposed to be very bitter, and not so palatable as other varieties, particularly if cut on the green side. It is late in maturing, has a good length of straw, and a long, thin, white grain.

Quantity of Seed per Acre

This depends upon a number of circumstances, the chief among which are: the method of sowing (whether broadcast or with the drill), the use to which the crop is to be put (whether for green feed, hay, or grain), the time of sowing, the district, and the habit of the variety (whether it is a scanty or profuse stooler).

On the Coast, where oats are largely grown for green feed, and where the sowing is usually done broadcast, from 2 to 3 bushels per acre should be sown. If sown too thickly, and heavy rain or showery, windy weather is experienced, the crop is liable to lodge, and as a result it may be partially or totally spoilt before it can be cut. A few farmers on the South Coast have seed drills, and where this method of sowing is adopted the amount of seed can be reduced to half that recommended for broadcasting. No matter what the crop may be intended for, drilling will always give the best results.

For hay on the Tablelands, 1½ to 2 bushels per acre is ample when sowing is done with the drill. Like wheat, oats may be sown a little earlier for hay than for grain, but the season of the variety must not be overlooked. In the drier wheat districts, 1 to 1¼ bushels per acre is sufficient for a hay

crop, provided the variety being sown is not too coarse in the stem. Very coarse-stemmed varieties, such as Potato and others, should always be sown thicker than varieties with comparatively fine stems, such as Algerian, as the thicker the sowing the finer the stems will invariably be in the resultant hay. Where the rainfall is sufficient, thick seeding is preferable, especially for hay, as the finer stems make better quality hay and a better sample of chaff. This is a very important point, as there is always considerable waste in feeding hay with coarse stems or chaff that has been cut from coarse-stemmed varieties. Under certain climatic conditions, and with certain varieties, 3 bushels of seed per acre would not be an excessively heavy seeding for hay.

Oats for grain on the Tablelands should be sown at the rate of 1 to 1½ bushels per acre, according to the time of sowing and the variety. In the drier districts, a bushel to the acre is ample for grain; but under moist conditions it may be advisable to sow as much as 2 bushels per acre, for a heavy seeding under such conditions generally induces a more even ripening.

Manuring.

Oats, like wheat, require manuring under most conditions, and respond bountifully to the application of superphosphate. On most soils, from 40 to 56 lb. per acre will be found sufficient; but on poorer lands the quantity can be increased up to ¾ cwt. with beneficial results. They appear to respond much more to heavy manuring than wheat. When sown early in the season, ½ cwt. of superphosphate is ample; but as the sowing season advances, the quantity can be slightly increased. In coastal districts, where there are practically no drills, and the manure (if used) has to be broadcasted, the quantity per acre should be increased to double that recommended for sowing with the drill. In some experiments conducted by the Department the addition of a little nitrogenous fertiliser in combination with superphosphate has resulted in slightly higher yields, and on the poorer granitic soils sulphate of potash in combination with superphosphate may prove advantageous; but it has yet to be definitely decided that the increase in yield due to the addition of the other fertilisers to the superphosphate is sufficient to compensate for the additional cost.

Treatment of the Growing Crop.

Oats do not root as deeply as wheat, and do not appear to be benefited to the same extent by frequent harrowing during the growing period, and they are also much more readily torn up by the spikes of the harrows. If the crop is sown very early, and has a tendency to grow too rank, it will be advisable to feed it off; but considerable judgment must be used in this matter, as it is very easy to do more harm than good. It is wise to avoid feeding off if possible, as in the majority of cases the effect is to reduce the yield. This has been very apparent from a hay point of view. However, if the crop has a tendency to grow too rank, and it is decided to feed off, the earlier in the season the sheep are turned in the better.

Loose Smut of Oat (*Ustilago avenae*). **Natural size.**

From McAlpine's "The Smuts of Australia."

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When to Cut for Hay.

Although it is recommended that wheat should be cut for hay at the flowering stage, to preserve the colour, &c. (one of the most important points for the Sydney market in prime wheaten chaff), such is not the case with oats. The best stage to cut oats for hay is when the upper tips of the heads turn white; at this stage the grain is fully formed, but only in the dough stage. The presence of grain in oaten chaff is absolutely essential for the Sydney market, and the chaff should be of a nice purplish-green colour. In selecting varieties for hay, those that ripen from the top should be selected.

Harvesting for Grain

In the cool, moist districts, where the binder is usually used for harvesting, the crop should be cut when the heads are well whitened, of a nice even colour, and the grain firm. It is very necessary to harvest before the chaff opens, as otherwise a considerable quantity will be lost through shedding. When the stripper or harvester is used, a considerable quantity of the grain has usually shelled before the crop is quite ready to strip, consequently the yield from a stripped crop is never as high as would have been the case had the reaper and binder been used

Oaten Hay for Market

There is always a good demand for oaten hay on the Sydney market, and if the sample is bright and clean and has fine stems, not too long, and of a nice, purplish green colour, good prices are assured It should be pressed in bales about 1½ cwt in weight, but certainly not heavier than 2 cwt The bulk of this commodity is utilised by horse-trainers for rack purposes, and from these men the best prices are obtained They prefer hay that has been cut with the mower and cocked in the field, as it is usually more evenly made. Algerian is the variety in greatest favour The hay, if cut with the binder, should have the bands taken off the sheaves, and should be shaken up before being put in the press On no account should the hay be pressed with the butts showing all the one way at the ends of the bale The bales should have three wire bands of No 8 or No 10 inch gauge The hay should not be pressed with a derrick press, but with one of the "Clyde" or "Koertz" type

Oaten Chaff.

There is always a strong demand for prime oaten chaff on the Sydney market. It should be about ⅜ of an inch in length, clean cut, of pleasant odour, free from mustiness, and of a nice, purplish-green colour Like oaten hay, the bulk is used by horse trainers or for horses doing fast work. Unlike wheaten chaff, oaten chaff is preferred with a fair quantity of grain. It should be put up in new bags weighing from 85 to 112 lb Algerian is preferred to "white oaten" on account of its generally being sweeter.

Oats as a check to "Take-all" and "Flag Smut."

Throughout the wheat-belt of this State two wheat diseases, namely, "Take-all" and "Flag Smut," appear to be getting more prevalent from

year to year, and unless methods of checking these diseases are adopted they will be the means of seriously reducing the annual production of wheat in this State. As far as the writer is aware, "Flag Smut" has never been known to attack oats, and there is only one case on record in this State where "Take-all" has been found on this cereal. Each of these diseases is due to a fungus, so it can be understood that by growing oats in paddocks where the previous wheat crops were badly affected with either of these diseases, they should help very materially in starving the fungus out. In such cases the following rotation is recommended:—

1914. Wheat crop affected with "Take-all" or "Flag Smut."
1915. Bare fallow, or fodder crop of rape or Algerian oats.
1916. Crop of oats for hay or grain.
1917. Bare-fallow or fodder crop of rape or Algerian oats.
1918. Wheat.

In the above rotation, if it be decided to sow a fodder crop on the land instead of bare-fallowing, this crop would be sown in February, fed off with sheep throughout the winter months, the land ploughed in spring and fallowed as a preparation for the main crop in the following autumn. Such treatment to a paddock over a period of three years should help very materially in stamping these diseases out. Oats are a valuable crop to sow for sheep feed, but for this purpose the sowing should be done not later than February or early March. Rape, when used for the fodder crop, should be sown at the same time as oats, or both crops may be sown together in alternate drills.

Making Wheat-bags Rat-proof.

A correspondent recently inquired whether there was any reliable mixture in which to soak bags to prevent them from being torn by rats or mice. The former were becoming a great pest in the Mudgee district, owing to the destruction of bags holding seed-wheat and fodder, and the difficulty of keeping them out of buildings. If some solution could be used in which to soak the bags preparatory to filling, it would save a lot of waste.

In reply, it was stated that bags which were to contain seed-wheat might be soaked with a poisonous solution, such as arsenic or copper sulphate, but bags which were to contain fodder could not be so dealt with, and the Department could not suggest a treatment for the bags under such conditions. It would appear that in this case the only course to adopt would be to make rat-proof the shed or barn in which the bags were to be stored.

Wheat Engorgement in Horses.

Compiled by the Veterinary Officers of the Stock Branch under the authority of S. T. D. SYMONS, M.R.C.V.S., Chief Veterinary Officer.

DURING the harvest season the Stock Branch constantly receives inquiries from wheat districts as to the treatment of horses which have gorged themselves on wheat, and are suffering from "colic" in consequence. Many valuable draught horses are reported to have died from this cause, and if they do eventually recover they are thrown out of work for a considerable time.

Usually the horse is found eating the wheat, and when signs of abdominal pain are noticed there is little doubt as to their cause. The intensity of the pain is unfavourably influenced by—

(a) The amount of wheat eaten.
(b) Working the animal directly after it has gorged itself.
(c) A predisposition of certain animals to gastric derangements.

Symptoms.

The symptoms may be but slight, the animal being dull, with no appetite, and sluggish at his work. The more serious cases set in very suddenly. The horse becomes restless, paws at the ground, looks round at its flank, and constantly kicks at the abdomen. As the pain is more severe, the animal throws itself about and rolls on the ground; the excitement rapidly increases, and it is dangerous to approach. The respiration is hurried, and the membrane of the eye becomes yellowish. Meanwhile the abdomen is noticed to be slightly swollen and tense, and sweating appears at the flanks. If no relief be obtained, the patient becomes increasingly dull and stupid, or the pain may be more and more intense until death occurs.

Temporary relief may be obtained by belching gas, or vomiting a little of the stomach contents, but owing to the structure of the equine stomach vomiting is almost impossible, and rupture of the organ is more likely to ensue. In this case the colicky pains suddenly cease, the animal becomes prostrated, and staggers to the ground bathed in perspiration. Death then takes place rapidly.

Treatment.

The object of treatment of this affection is to remove the impacted mass from the stomach. Experiments carried out at the Melbourne Veterinary Institute showed that death was due to a poison formed by the wheat while in the stomach. To counteract this, therefore, some alkaline substance, such as bicarbonate of soda, is necessary.

The animal should be allowed as much water as it likes to drink. The theory that water causes an additional swelling of the wheat, and thus ruptures the stomach, has no basis, since the digestive juices are present in sufficient amount to cause the grain to swell.

To hasten the action of the bowels, saline purgatives are preferable to aloes or linseed oil.

Epsom salts, 4 to 8 ounces;
Ground ginger, ½ ounce;
Water, 1 pint;
or
Bicarbonate of soda (baking soda), 4 ounces;
Water, 1 pint;
or
Common salt, 1 to 2 ounces;
Water, 1 pint.

Enemas of large amounts of soapy water injected into the rectum stimulate the movement of the bowels, and thus aid in expelling their contents.

In the more serious cases, these measures may not be found to bring about much improvement, and a qualified veterinarian should be called in, if possible, since he has at his command certain apparatus and more potent drugs, which are too dangerous to be used by an unskilled man. If such is not available the animal might be given—

Chloral hydrate, 1½ ounces.
Water, 1 pint.

This counteracts the spasms, checks fermentation, and thus gives the animal a chance of recovery. Under no circumstances should the animal be permitted to roll, as this frequently results in rupture of the stomach.

While recovery is taking place, only laxative soft food should be given until the tone of the digestive system is restored.

The horse should not be put to work too soon after an attack.

Laminitis or founder is a frequent sequel to this affection.

Rutherglen Bugs at Oberon

A correspondent asked for information about Rutherglen bugs,—how they bred, and if a contact spray would destroy them. They proved very troublesome in the vegetable garden, and later on congregated at night under sheaves and such like, where they could be killed in great numbers in the early morning if a deadly spray could be turned on them.

In reply, the Entomologist stated that the Rutherglen bug lays its eggs on grass and rubbish. On emerging from the egg the young bug resembles the adult in shape, but the wings are undeveloped. After feeding upon the plant sap and passing through several moults, the wings are fully developed, and the now adult bug flies off.

Kerosene emulsion will kill them, but would need to be very strong, and it cannot be used in a pump with rubber valves. Boiling water is very effective, but is difficult of application.

Weeds on the Murrumbidgee Irrigation Area.

E. BREAKWELL, B.A., B.Sc., Agrostologist.

[While the following report refers specifically to the weeds to be found on the Murrumbidgee Irrigation Area, much of the advice given is of general application.—ED.]

ONE of the worst troubles to be faced by the irrigation settler is the prevalence of weeds. The moist conditions are excellent for the growth of these robbers, and the profuse weedy vegetation to be seen at any time in the ditches and smaller canals clearly indicates the menace the weeds can be if allowed to get out of control. It is also evident that the best encouragement for weed growth is to allow the plants to shed their seed. "Ill weeds grow apace"; in other words, weed seeds germinate very readily, and every settler should be continually reminded that "one year's seeding means many years' weeding." There is nothing more discouraging than that the work of a clean farmer in keeping down weed growth should be nullified by the negligence of his neighbour in allowing the weeds on his holding to shed their seed. The seeds of many weeds are particularly adapted for dispersal by wind, being provided with a pappus or fringe of hairs for this purpose. The strong winds of Yanco could easily carry the weed seeds from one end of the irrigation area to the other.

The destruction of weeds has been a subject for experiments of many different natures, and of late years chemical mixtures have been boomed as producing very beneficial results. One is loth to discredit the value of chemical mixtures, considering the value of arsenite of soda on weedy paths and the results of ammonium sulphate on clover and trefoil patches in lawns. But sufficient data concerning the chemical destruction of weed growth are available to show that it is impracticable on large areas and in crops. The best methods known at present for the destruction of weed growth are a vigorous and constant attack with hoe, cultivator, or plough, or to smother early weed growth with a strong growing crop; in all cases to prevent weeds from growing to maturity.

Most of the weeds on the Yanco irrigation area are annuals, that is, their life is confined to a single season. At the same time, however, it must be remembered that the annuals are among the freest flowering and heaviest seeding plants, and generally the quickest growing, and, as a rule, as much harm is done by allowing an annual to seed as a biennial or perennial.

Some of the plants growing on the irrigation area are only weeds under certain conditions, that is, when appearing on cultivated lands. I refer particularly to such plants as Burr Trefoil (*Medicago denticulata*), a hairy

Burr Trefoil (*Medicago minima*), Crowfoot (*Erodium cygnorum* and *E. cicutarium*), Ball or clustered Clover (*Trifolium glomeratum*), and others. Who would designate such plants as weeds when growing on the dry areas? Yet such plants growing on a lucerne patch could reduce the yield by fully 50 per cent. Fortunately these weeds, at any time, are not as harmful as others to be enumerated later, and can even be utilised to a certain extent. The trefoils, wild vetches, and clovers, being leguminous plants, tend to benefit the soil by their manufacture of nitrogen compounds. By ploughing these plants under not only does the soil benefit from the added nitrogen, but the resultant humus is also extremely beneficial. Such plants growing in orchards could well be utilised in this way; indeed, in such situations they can hardly be regarded as weeds.

Again, it is not commonly known that Crowfoot is largely cultivated in America as a fodder crop, and is credited with making excellent ensilage. On the irrigation area it must, of course, be far inferior to corn or sorghum in this respect, but it is pointed out that a bulk quantity of the plant need not be wasted.

A few of the native plants growing at Yanco before irrigation was available are, under the improved conditions, likely to become pests if not kept under control. Particularly is this the case with such plants as Caltrops, Cat's-head, or Bull's-head (*Tribulus terrestris*), Burr Amaranth (*Alternanthera triandra*), *Sida corrugata* (a kind of mallow), Couch grass (*Cynodon dactylon*), *Epilobium glabellum*, Cress plant (*Lepidium ruderale*), and Cotton plant (*Erectites arguta*).

Cat's-head or Bull's-head is a plant very similar to a vetch, except for a characteristic seed which is large, angular, and provided with short, sharp spines. It is the latter that is extremely troublesome to the feet of horses and cattle. The plant has absolutely no fodder value, and one plant will cover a good area of ground. The plant seeds from midsummer to autumn, and should therefore be destroyed before this period.

Burr Amaranth (*Alternanthera triandra*) is closely allied to our favorite bordering garden plant with variegated leaves. It spreads rapidly under cultivation. Being susceptible to frosts, however, it can be easily suppressed by attacking it in the winter months.

Couch grass is too well known to require more than slight reference. Its suppression on cultivated lands can only be accomplished by vigorous and constant attacks on suitable occasions. The grass is very sensitive to frosts, and advantage should be taken of this to plough up the grass in the winter, exposing the roots to a good freeze. If ploughed in summer, care should be taken to burn the grass when dried, as the roots are extremely persistent in obtaining a hold wherever thrown.

Cress plant (*Lepidium ruderale*) is characterised by its small, ovate fruits on the long stalk, with its extremely small white flower at the top. The plant seeds so readily that unless destroyed before maturity it will be

extremely difficult to eradicate. The best season for attack is in the early spring. The other native plants mentioned are best attacked in the winter.

Many of the worst weeds on the Yanco irrigation area are those which have been introduced in some way, and become quickly established. Striking examples of these are:—

Lactuca scariola and *L. saligna*, commonly known as Prickly Lettuce. This plant can be easily recognised by its prickly leaves, and the white milky sap in the stem. The root system is extremely well developed and the plant is a most persistent one. Unless the taproot is bodily removed the plant will readily come again. The plant flowers very freely, and the seed, provided with a pappus of hairs, is specially adapted for dissemination by the wind.

Prickly lettuce not only absorbs a vast amount of moisture from the soil, but its thick leafy growth will smother all plants with which it comes in contact. The spring is the best time to attack this plant. Its flowering season is from October to January

Several kinds of docks are found on the irrigation area, including *Rumex crispus*, *R. halophilus*, *R. cystallinus*, *R. flexuosus*, and *R. pulcher*. The presence of docks, as a rule, indicates undrained or sour soil. They often make their appearance when land, after a crop has been removed, is allowed to lie idle. Bare fallowing is generally efficacious, and if the plants are removed in their early stages the new crop will keep the weed in subjection.

Thistles are, of course, common on the area. The worst of these are:— *Centaurea melitensis* (Maltese thistle), *Carduus marianus* (Variegated thistle), *Carduus lanceolatus* (Slender thistle), *Kentrophyllum lanatum* (Cockspur).

No use can be found for thistles. The slight fodder value attributed to *Centaurea melitensis* can be neglected on an irrigation area. The quick-spreading habit of thistles renders them serious pests on any cultivated lands, and as the seeds are quickly disseminated by the wind, the plant needs to be destroyed in its early stages, viz., in the early spring.

Another weed of the worst order is *Polygonum aviculare* (wire weed). This runs for a great distance along the ground, has a deep taproot, and is most persistent. It is characterised by its extremely small pinkish flowers along the runners. Only constant cultivation will suppress it

Finally, the well-known barley grass is likely to prove a serious pest during the cooler months, and autumn cultivation should be vigorously carried out to suppress it

A Trial of Berseem or Egyptian Clover (*Trifolium alexandrinum*) at Grafton Experiment Farm.

This season's trial of Egyptian clover was sown on 2nd April on the red volcanic upland soil of this farm. The plot, approximately $\frac{1}{20}$ acre in area, was previously laid down to lucerne, which was ploughed out on 26th February. Several cultivations and two further ploughings were given, and the surface was in excellent condition at the time of sowing. The seed was broadcasted by hand at the rate of about 20 lb. per acre, and was covered with the hand-rake.

The germination was very satisfactory, and the plants came away well, although conditions were very dry for the first month.

The weeds were very thick, and it was found necessary to hand-weed on 6th July. The crop was then 12 inches high and coming into flower, but for obvious reasons the yield was not estimated.

Good falls of rain, just after cutting, caused it to stool out well, and it was well in flower, 17–18 inches high, when cut for estimation of yield on 12th October. An area of one-thirtieth of an acre was cut, and yielded 435 lb. of succulent green clover. This gives a computed acre yield of 5 tons 16 cwt. 2 qrs. 2 lb.

The rainfall recorded for this cut from the last mowing to flowering was:—

July	2·72 inches.
August	·74 ,,
September	·80 ,,
Total	4·26 inches.

Taking into consideration the low rainfall, and the class of soil on which this crop was grown, the yield obtained must be regarded as satisfactory.

For a supply of winter forage this clover, in combination with cereals, should be very valuable, and when grazed off two or three times it should produce a very high yield of nutritious fodder.

The chief points in favour of a more extended growth of *Trifolium alexandrinum* are:—

1. The high yields of green stuff obtainable. Four or five cuts may be made in a season, yielding 5 to 8 tons per cut.
2. It is more drought-resistant than any clovers so far tried here.
3. It is not killed by light frosts.
4. It is a soil-renovating crop of a high order, being a legume, and enriching the soil by the fixation of nitrogen.
5. Where irrigation facilities exist it has proved in other districts to be an excellent winter fodder.—W. D. Kerle, Experimentalist.

[In view of the excellent results achieved, the Experiments Supervision Committee has arranged for an experiment to contrast the yields of Egyptian clover and cereals with those of vetches and cereals in a Winter Fodder trial at Grafton Experiment Farm.—Ed.]

Experiments with Various Types of Lucerne.

E. BREAKWELL, B.A., B.Sc., Agrostologist.

THE lucernes growing at the Experiment Farms may be divided into the following types:—Tamworth, Peruvian, Arabian, Sand, Turkestan, and American.

New South Wales Types.

The Tamworth type of lucerne is characterised by an erect growth, rather woody stem, large tap root, and leafy branches. A typical Tamworth lucerne plant, not in flower, growing at Bathurst Experiment Farm may be described as follows:—Stem erect with many branches, rather woody, with a large amount of foliage. Leaves broader at bottom than at top. Bottom leaves three times as long as wide, top leaves four to five times as long as wide. Petiolule of middle leaflet the longest, about one-quarter as long as petiole. Stipules three-fifths as long as petioles, very sharp pointed, with two or three teeth on the outer edge.

The Hunter River and Mudgee types are essentially similar in habit to the Tamworth, and little difference can be noted in the amount of growth obtained from these lucernes as compared with that from the Tamworth. The Mudgee type, however, at Cowra, seems to thrive better during the winter months than the Tamworth or Hunter River types, probably due to local acclimatisation.

Owing to its erect habit the Tamworth type of lucerne is particularly adapted to haymaking, and up to the present has produced the largest quantity of feed of all lucernes at Grafton, Wollongbar, Yanco, and Bathurst Experiment Farms, and at Hawkesbury Agricultural College.

Peruvian Lucerne.

Peruvian lucerne can very readily be distinguished from the Tamworth type. The principal point of difference is in the greyish appearance of the plant, due to the hairiness of the leaves. The leaves at the base of the plant are scantily clad with hairs, but the pubescence increases from the base upwards, and the top leaves are densely covered. The grey colour of the plant is also assisted by the character of the veins in the leaf. The midrib and secondary veins are broader than those of the Tamworth type. This is due to the presence of a wider strand of colourless water storage tissue.

Other points of difference in this lucerne are:—(1) There are fewer stems, and these are less branched than those of the Tamworth type; (2) quick growth of stems after cutting; (3) the short leaf stalks (all the leaves are

as long and sometimes longer than the leaf stalks); (4) a smaller amount of foliage to each stem. The flowers are also generally longer than those of the Tamworth type.

Peruvian lucerne is credited with thriving best in a climate of mild winters and hot, dry summers. Wagga, Cowra, Bathurst, and, to a less extent, Glen Innes have climates corresponding to these conditions. At Bathurst and Glen Innes, however, this lucerne appears to be inferior to Tamworth, both in the winter and summer months. At Wagga and Cowra the winter growth appears slightly better than that of Tamworth, but the slight difference between the two does not justify any preference for the Peruvian.

Arabian Lucerne.

Arabian lucerne requires somewhat the same climatic conditions as Peruvian, but is much more sensitive to cold than the latter type. This is well seen at Glen Innes, where it made only one-third to one-half the growth of other types during the winter months.

This lucerne is characterised by extremely succulent stems, containing less fibrous matter than Tamworth. It is as hairy as Peruvian, and has much larger and more oval leaves than the latter.

It does well at Wollongbar, Cowra, and Bathurst Experiment Farms. At Wollongbar, during the cooler months, it is superior to Tamworth. It makes rapid growth after cutting.

A characteristic feature of Arabian lucerne is the short life of the tap root. If a plant of three or four years old be examined, it will be found that the main root has become rotten, while the new plant growth springs from shoots from the surface of the tap root. It is probable that this characteristic will militate against its drought resistance.

Sand Lucerne

Sand lucerne (Fig. 1), as originally bred in America, is said to be a cross between *Medicago falcata* and *Medicago sativa*, *i.e.*, between the yellow-flowered lucerne and the ordinary type. The resulting plants are credited with showing the variation in the colour of the flowers, ranging from yellow to purple, while also maintaining to a large extent the prostrate habit of its parent, *M. falcata*. It is admitted, however (in America), that many plants of so-called Sand lucerne show no distinct yellow flowers, and are very similar to the ordinary type.

In New South Wales Sand lucerne has been tried at Wollongbar, Grafton, Glen Innes, Cowra, Bathurst, and Wagga Experiment Farms, at Hawkesbury Agricultural College, and at Nyngan Demonstration Farm. In no cases have distinct yellow flowers been perceived. Variations from a dark blue to a very pale violet are frequent, and it thus appears that the reversion to the original *M. sativa* is not quite complete. This is also borne out by its prostrate or semi-prostrate habit in the field. On examining a typical Sand lucerne plant it will be found that a large amount of foliage is produced at the crown of the plant, much more than in the other lucernes, and

Fig. 1.—Tamworth Lucerne and Sand Lucerne Seedlings compared.

Note the early tendency of the Sand Lucernes to assume a prostrate habit.

EXPERIMENTS WITH VARIOUS TYPES OF LUCERNE.

Fig. 2.—Montana Lucerne at Glen Innes Experiment Farm.

Fig. 3. - "Bathurst No. 1."— A selection from Provence lucerne by the Manager of the Bathurst Experiment Farm.

It is characterised by a small leaf and a dense, prostrate habit.

EXPERIMENTS WITH VARIOUS TYPES OF LUCERNE.

also that the roots arising from the top of the tap root are more numerous than in an ordinary type like Tamworth. Many of these secondary roots will be found to take on a shallower character than other lucernes.

Owing to its prostrate or semi-prostrate habit Sand lucerne cannot be recommended for hay. But it should be particularly adapted to pasture, owing to its heavy growth of foliage at the crown.

There appears no doubt that Sand lucerne is more drought resistant than any other lucerne. This has well been borne out by trials at Wagga and at Nyngan. The particularly dry period which Nyngan has experienced has almost proved too much for the Tamworth lucerne, whereas the Sand lucerne has shown remarkable vitality, and has subsisted during the present year with only 6 or 7 inches of rain. At Wagga also it appears to stand the dry weather better than others.

The best results have been obtained by sowing thinly in dry districts in rows 2 feet 6 inches or 3 feet apart. This method enables each plant to obtain much more of the small amount of moisture available than if the rows were more narrow. The bulk and vitality of the plant are thus considerably increased. Occasional cultivation between the rows has also been shown to make a big difference.

Turkestan Lucerne.

Turkestan lucerne is characterised by a thick leafy growth and rather small leaves. In no case, however, has it proved superior to Tamworth.

American Strains.

In appearance these lucernes are similar to the Tamworth type. They show, however, the results of acclimatisation in America, and certain local strains have there been raised which have proved superior to the older types. Instances of these are Montana, Oasis, Northern Californian, Kansas, and Grimm lucernes.

All these have recently been imported from America into this State, and are being tried at the Experiment Farms. The results of acclimatisation in America are well shown by the progress of certain types here. For example, Montana lucerne (Fig. 2), coming from a district with very cold winters and extremely hot summers, does very well at Glen Innes, which has a similar climate, and has proved superior to Tamworth. Although not growing much higher than Tamworth it stools more considerably and produces a greater bulk of feed. On examining the root system the tap root is found to be much larger and the other roots more numerous than those of the Tamworth type.

Northern Californian, coming from a district with a similar climate, has also done well at Glen Innes.

Kansas lucerne is showing promise at Hawkesbury Agricultural College and at Cowra Experiment Farm.

Oasis lucerne, credited with standing dry conditions in America, is doing well at Grafton, Cowra, Bathurst, and Yanco. This lucerne is exhibiting a semi-prostrate habit, and appears similar in structure to Sand lucerne.

Other types of lucerne, other than American, being tried at the Experiment Farms, are Algerian and Chubut. Algerian does best at Glen Innes, where it is a strong rival to Montana. Chubut lucerne, from Patagonia, is thriving well at Yanco.

Selected Types.

Lucerne plants lend themselves to a great deal of variation in the field. While many of these variations are useless commercially, a distinguishing characteristic sometimes stands out sufficiently to justify an extended trial of the plant. For example, the Manager of the Bathurst Experiment Farm has selected from Provence lucerne a type characterised by small leaf, and a dense and prostrate habit. This has been provisionally designated as Bathurst No. 1 (Fig. 3). This lucerne has now been extended to Glen Innes and Hawkesbury Agricultural College, where it remains a distinct feature among the lucernes. It is quite probable that this lucerne will eventually adapt itself more to grazing than for hay.

Lucerne plants of exceptional vigour and leafiness are often noticeable in the field. It is hoped that, by extending these, the progeny will eventually result in a superior strain.

Saw-dust as a Fertiliser or a Mulch for Fruit Trees.

A Wyong correspondent who had just planted out 800 fruit trees, and who was in a position to obtain considerable quantities of saw-dust, recently asked whether it would be advisable to use it either as a fertiliser or as a mulch.

In reply, the Chemist to the Department stated that saw-dust is of little or no value as a direct fertiliser. Its chief value is in forming a mulch and preventing undue evaporation of water from the surface soil. It should be of benefit if lightly dug in around the trunks of fruit trees, or it may be conveniently made use of to absorb liquid manure, urine, &c.

If the saw-dust be placed in large heaps it will destroy vegetation by excluding light and air from the ground, which will thus be rendered sour.

An objection to the use of saw-dust is that it is full of the eggs of certain insects, which develop under favourable conditions, when the saw-dust rots and is moist, and these are liable to damage crops.

From what little experience the Department has had with saw-dust as a dressing, it is not in a position to recommend the use of same. If, however, it is decided to apply the saw-dust, it would be advisable to experiment upon a few trees for the first season in order to thoroughly test whether it is safe to use.

Notes on Panicum helopus Trin.

AND ON TWO AUSTRALIAN GRASSES THAT HAVE BEEN CONFUSED WITH IT.

J. H. MAIDEN and E. CHEEL.

1. Panicum helopus Trin.

P. helopus Trin., is nominally recorded in B.Fl. vii, 476, from the following localities:—

1. *New South Wales and Queensland*—Darling River and Cooper's Creek. Domin, in Fedde's *Rep. Spec. Veget.* x, 6 (Oct. 1911) states this is *P. notochtonum.*
2. *Northern Territory.* Lower Victoria River. (var. *glabrior* Benth.) Domin, *loc. cit.* in referring to this form, states that it . . . "is, however, distinct from *P. notochtonum* as well as from *P. javanicum,*" but does not state what it is.

So far as we know, the true species has not been recorded from New South Wales, and not even from Australia. It is obviously very desirable that students of our grasses shall have readily available an authentic drawing of the species.

Duthie, in his "Illustrations of the Indigenous Fodder Grasses of the Plains of North-western India" (Roorkee, 1886), figures *P. helopus* under the name of "Kuri"; his form has very broad leaves. At page 8 of his "The Fodder Grasses of Northern India," the handbook which accompanied the plates, he observes that it is an excellent fodder-grass for both horses and cattle in India, that it is found chiefly on cultivated ground of the plains, and that it occurs on the Himalayas up to about 5,000 feet.

We have not definite information as to the forage value of the Australian grass, but this will later on be available now that the confusion around it has been cleared up.

It will be convenient, under the circumstances, to quote a description of *P. helopus* Trin., which is herewith, and it will be noted that Dr. Stapf, who is responsible for the Gramineæ in Hooker's work, gives *P. helopus* as a synonym of *P. javanicum* Poir. This also explains why Domin referred to *P. javanicum* above.

Panicum javanicum Poir.=*P. helopus* Trin. Annual. Stem 1–2 ft., decumbent and rooting below, nodes pubescent. *Leaves* 1–5 by $\frac{1}{3}$–$\frac{2}{3}$ in., flat or undulate, very variable in breadth and form of base, lanceolate, acuminate and loose sheath laxly hairy ; ligule a beard. *Spikes* $\frac{2}{3}$–2 in. long, secund, spreading ; rhachis 3-gonous, pubescent and with a few long hairs. *Spikelets* $\frac{1}{8}$ in., geminate or upper solitary, usually pubescent, pale ; pedicels very short ; gl. 1. acute or obtuse ; III. male, palea oblong ; IV. rounded at the tip. (Hooker's *Flora of British India*, Vol. vii, p. 36.)

EXPLANATION OF PLATE OF PANICUM HELOPUS.

1. Plant, natural size.
2. Portion of leaf-sheath and leaf-blade showing ciliate margin and bearded ligule.
3. Portion of inflorescence showing rhachis with three spikelets subtended with bristle-like hairs and short pedicels with spikelets fallen off.
4. Spikelet opened out, showing—
   (*a*) outer glume;
   (*b*) second empty glume;
   (*c*) third glume with (*d*) palea;
   (*e*) flowering or fruiting glume with minute awn-like point;
   (*f*) palea.
5. Palea dissected from third glume showing abortive stamens.
6. Grain showing club-shaped hilum.

Drawn from a specimen from Kew, determined by Dr. Otto Stapf, labelled "Punjab, Lahore (India), T. Thomson, Aug., 1846."

Trinius, in his "Species Graminum," vol. II, St. Petersburg (1829), figures his type of *P. helopus* from the Mascarene Islands.

2. P. notochtonum Domin.

(*P. helopus* Benth., non Trin.)

Panicum notochtonum Domin, Fedde *Repert,* X, 60 (1911).

Professor Domin's description may be briefly transcribed as follows:—

Very closely allied to *P. javanicum* Poir., but differing chiefly in the spikelets being glabrous and the primary or first glume being minutely dilated at the base so as to embrace the others, truncate, somewhat keeled, the nerve ending in a short point, second glume 9-nerved, third glume 7-nerved, the nerves at length are more or less prominent.

It may be more fully described as follows:—The whole plant about a foot high, with lanceolate leaves, more or less cordate at the base, with somewhat undulate or crisp margins which are sprinkled with tubercled-based hairs. Fruiting glume is as in *P. javanicum,* transversely rugose, and has a short awn-like point.

Habitat and Range.—Darling River (Dallachy); Tongo Station, Wilcannia (W. J. Hourigan, January, 1912); Girilambone (W. Grigg, April, 1913); Yandama (A. W. Mullen).

At the beginning of this paper it has already been indicated that this is the Darling River (N.S.W.) plant which Bentham erroneously referred to *P. helopus* Trin.

EXPLANATION OF PLATE OF PANICUM NOTOCHTONUM.

1. Portion of plant slightly enlarged.
2. Portion of leaf-sheath and leaf-blade, showing ciliate margin and tubercled-based hairs on the sheath and cordate base of blade with tubercled-based hairs on margin, also bearded ligule.

Panicum helopus Trin

Panicum notochtonum Domin.

3. Portion of rhachis showing four spikelets *in situ.*
4. Spikelet opened out showing—
   - (*a*) minute outer glume;
   - (*b*) second empty glume;
   - (*c*) third glume, with (*d*) palea;
   - (*e*) flowering-glume with minute awn-like point.
5. Flowering-glume opened out to show the palea.
6. Palea or neuter flower from third glume, showing aborted stamens.
7. Grain showing oval-shaped hilum.

3. P. intercedens Domin

(*P. helopus* Maiden, non Trin.)

Panicum intercedens Domin, *Journ. Linn. Soc.* (*Bot.*), xli, 271 (1912).

The following description is based on the original (in Latin):—

Stems slender, branched at the base, glabrous, smooth, 12 inches or more high.

Leaves distant, the leaf-blades sub-erect, acute, sub-cordate at the base, glabrous or readily pilose, sheaths smooth, glabrous; ligule ciliate.

Panicle simple, the rhachis glabrous and channelled. Spikelets sub-distant, biseriate, nearly sessile, about 4½ mm. long, usually pale or rarely coloured.

1st glume glabrous, half as long as the others, amplexicauled, acute or sub-acute, 7-nerved.

2nd glume and 3rd glume ovate-oblong, acute, 3-nerved, the back and apex as well as the margins having long hairs; 4th glume a little shorter about 3½ long, sub-acute, 3-nerved.

This species is allied to *P. distachyum*, L., but may be distinguished by the more hairy glumes.

We do not know from direct evidence the quality of this grass for forage purposes, but from the appearance of it, and judging by analogy, it is probably a very valuable grass.

Habitat and Range.—It is recorded by Domin from between the Ashburton and De Grey Rivers, North-western Australia (type).

In the National Herbarium there are specimens from the following localities:—

North-western Australia. Goody Goody, in sandy loam—W. V. Fitzgerald, April, 1905; A. Crawford, 1909 (no precise locality given).

South Australia. Tennant's Creek.

New South Wales. Warren—Agriculture Department, February, 1903; Warialda—E. J. Hadley, April, 1909; Gravesend—E. Breakwell, March, 1913.

This plant was figured in the *Agricultural Gazette of New South Wales*, XIV (1903), opposite page 241, by one of us, erroneously under the name *P. helopus* Trin.

It was pointed out that the plant figured as *P. helopus* differed from Trinius' type in the following points:—

1. It is a glabrous form, the outer glumes being alone hairy. It would appear that this species is very variable in this respect.
2. The leaves are narrower. Some Indian forms are much broader leaved.

3. The fruiting glume is not produced into an awn-like short point. This point is often the best diagnostic character in this species. Indian specimens show this awn, and I have a Northern Territory specimen which is intermediate in character between Indian ones and that of our own which came from Warren, New South Wales.

Bentham's remark that *P. helopus* resembles *Eriochloa* in appearance applied with most appropriateness to our New South Wales plant, and should be borne in mind.—(*Agricultural Gazette, N.S.W.*, XIV, p. 241, March, 1903.)

Summary.

To summarise, we have:—

1. Spikelets in pairs, at least in the lower part pilose, ovate, the other glume somewhat acute, not facing the rhachis.. .. *P. helopus*
2. Spikelets singly glabrous, acute, the obtuse minute outer glume facing the rhachis .. .. *P. notochtonum*
3. Spikelets sub-distant, biseriate, the third glume pilose or fringed on the dorsal margin and apex .. .. .. *P. intercedens*

No. 1 is not found in Australia, so far as is known at present.

No. 2 is the plant referred to by Bentham to *P. helopus*.

No. 3 is the plant figured in *Agricultural Gazette* as *P. helopus*, as already stated.

A Grass Detrimental to Stock.

Seeds of a grass found growing in the Cessnock district, and which was considered to be detrimental to stock, were recently submitted for identification.

The Agrostologist to the Department stated that the seed had been identified as that of *Bromus maximus*, Desf. a useless grass introduced from the continent of Europe. It occurs in pastures and waste lands throughout the State. Apart from the grass being of little fodder value, even in its young state, its sharp seed, when the plants are mature, are a serious menace to stock.

If a number of other useful grasses are growing with this one the only danger generally is from eye infection, as the stock seldom eat the grass when better varieties are available. But if the pasture is a poor one, and this grass is growing in great abundance, the seeds are likely to penetrate the tongue or membranes of the mouth of the stock eating it, and thus cause a considerable amount of damage.

Fungus and other Diseases of Apple Trees.

G. P. DARNELL-SMITH, B.Sc., F.I.C., F.C.S., Biologist; and E. MACKINNON, B.Sc., Assistant Biologist.

Canker.

THE term "canker," as applied to plant diseases, has been in use for a long time, but, like many popular names, the meaning is often somewhat indefinite, and in different countries it has varying significance. In Europe it is used to designate the injury done to trees by species of the fungus *Nectria*. In fact, the *Nectrias* have been associated with such injuries so long that the word "canker" has come to be regarded as a specific rather than a general term. In England the term has been used to designate the irregular and knotty excrescences produced by the efforts of the tree to heal up injuries and wounds caused by such agencies as sun-scald, frost, adverse weather conditions, or parasites. In America the term is applied to all diseases involving more or less extended areas of bark, although these diseases differ widely in cause and in the effects produced on the host.

In Australia the term may be applied in the American sense, indicating injury to the bark by such agencies as weather (sun, frost, wind), soil conditions, and parasitic fungi. Often, in severe cases, the bark is destroyed and the wood laid bare.

These cankers interfere with the nutrition of all parts of the limbs above the affected areas, and may finally result in the death of the limbs, unless the wounds become healed over.

The main elements to be observed in a transverse section of an apple-tree are well known. Proceeding from without inwards, they are the bark, the bast, the cambium, and the wood. The cambium, by division of its cells, adds yearly to the growth of the wood and of the bast, and because it is this layer that is instrumental in the formation of new cells, it is this layer that is mostly concerned in the production of successful grafts and in the healing over of wounds by the formation of callus. Herein lies the difference between a wound and a canker. If the tree receives an injury it attempts to heal it over by the formation of callus, and provided it receives no further irritation, the healing is generally rapid and complete. But if the tree receives an injury, and, while attempting to heal it, is subjected to further irritation at the spot, whether at intervals (as by periodic frost-bite) or continuously (as by the steady invasion of its tissues by a parasitic fungus), then the cambium never gets a chance to complete the healing work, and a canker results—the manifestation of continuous efforts and failures in this direction.

Of cankers produced by frost there are two varieties—the "open" canker and the "closed."

In the open canker (Fig. 1) there is a broad, central, open wound. Around it are a number of overlapping ridges, dark in colour, which every year recede farther and farther from the central wound. That is, every overlapping ridge is but incompletely covered by the succeeding one, the outermost ridge being usually thicker than those nearer the centre. The surface of the wound gradually increases, because the first developed overlapping ridges of callus die off, being killed annually by frost before they have met, until the stem, almost in its entire girth, is seized by the cankerous growth, and perishes. The annually increasing thickness of each overlapping edge is due, no doubt, to the fact that the descending sap of the still living, leafy branch has in each succeeding year, in consequence of the receding of the overlapping edges, to diffuse itself over a smaller portion of the circumference of the branch, giving thus an extra supply of nutriment to the cambium zone.

The closed canker (Fig. 2), when fully developed, presents an almost globular protuberance. Frequently it is three or four times greater in diameter than the branch itself. It is generally woody, knotty, and covered with bark. In spite of its name there is to be found in a closed canker the remnants of a central fissure, bounded by dark-coloured decayed cells, marking the original point of injury. This fissure never quite closes, and frequently there is a funnel-shaped depression from the exterior leading into it.

Cankers of this kind may grow very rapidly; they always commence in wooded branches, and are never found in a green shoot less than a year old. In the colder districts trees affected with canker frequently have upon them a somewhat luxuriant growth of lichens. Sorauer considers that small fissures produced in the bark by frost are the starting points from which cankerous growths issue. Cankers are most liable to develop on the stem at the points where buds or young branches are emerging. There is evidence that every cankerous spot shows as a commencing point a wound, which penetrates in the form of a narrow fissure as far as the cambium, and that the cambium cells immediately adjacent to this wound are destroyed. This wound probably occurs shortly before or at a time when the tree develops its highest vegetative activity, as the covering over of the wound by the formation of new tissue is immediately attempted. That these forms of disease may be due to frost is rendered probable by the fact that through the influence of artificial frosts it has been possible to produce such commencing stages as are to be found in very young cankers. Experience has shown that there are certain situations and varieties of soil in which trees become easily affected with canker; these are, for instance, the so-called frost situations, soil of a marshy nature, non-porous subsoils, &c. While cankerous growths are most frequently found upon trees of luxuriant growth, they are numerous in certain districts upon poor, slender trees. Certain fungi usually found associated with cankers can only gain a hold

upon the tree through a wound. Damage to the tree caused by frost appears to offer such fungi their most frequent opportunities.

In some trees canker is frequently found at the base of a branch, and this is particularly the case in those trees in which the difference between the main stem and the auxiliary branch disappears and two similarly thick branches diverge from one starting point. The number of thin-walled cells produced in such a situation is supposed to render this region especially susceptible to frost. The term "forked blight" is sometimes used for those cankers which occur in the position just described. In canker diseases it is frequently found that only individual trees are attacked in the midst of large plantations. This predisposition to canker is usually found to be associated with the individual inclination of the tree to produce medullary rays that tend to expand at their outer extremities. The general concensus of opinion is that the late spring frosts are those most concerned in the starting of cankers, and any protection from frost that can be applied to the trees is desirable.

We have seen that injury to the cambium is the cause of canker, and that this may be caused by cold. Injury to the cambium may also be brought about by heat, when it is sometimes spoken of as "sun-scald"; and mention of it may be made here. Injury through exposure to excessive heat from the sun is usually accompanied by a lack of the necessary amount of moisture in the soil. The characteristic of this form of canker is that it occurs extensively on the trunk and branches upon one side only, viz., that exposed to the sun. The parts injured show dark-brown to black isolated or confluent patches in the bark, which at these places is dry and unyielding. In some cases the dead or dying bark contracts and cracks, and fissures more or less deep are formed. Fissuring due to sun-scald sometimes shows patterns suggestive of a Maori carving. The fissures are not often so marked as in this case, brown blotches beneath the skin being much more general.

As a remedy for sun-scald, painting over the limbs with a thick coating of lime-wash has been suggested, and the encouragement of the tree to produce sufficient foliage to shade itself. Dark patches somewhat similar to the above in appearance, but not dry and unyielding, occur normally in the bark of some species, notably the Irish Peach apple.

Numerous fungi are recorded as the cause of cankers on apple and pear trees throughout the world, and although we have some of them in New South Wales, some that are well known in Europe and America have not yet been recorded here. There is, however, always a possibility of accidental introduction, and it is thought to be desirable to include here some account of them.

The following fungi occur here, and are known to produce cankers:—

Sphaeropsis malorum (Peck.), Black Rot.

Glœosporium fructigenum (Berk.), Bitter Rot, Ripe Rot (= *Glomerella cingulata* (Stonem), S. and von S.).

Valsa sp.

Phyllosticta sp. (Blotch).

The following fungi that are known to produce cankers have not yet been recorded here:—

Nectria ditissima (Tul.), Apple-tree Canker.
Nummularia discreta (Tul.), Blister Canker.
Phomopsis mali (Roberts), Rough Bark.
Bacillus amylovorus (Burrill), De Toni, Blight.

Nectria has been reported in New Zealand as causing cankers on apple and pear trees.

In this article we shall deal with *Glœosporium, Phyllosticta, Nectria,* and *B. amylovorus* only; the others will be dealt with subsequently.

Bitter Rot, or Ripe Rot (*Glœosporium fructigenum*, Berk.).

The term "Bitter Rot" owes its origin to the taste of the affected tissue, but the bitterness varies very much, and may not be detected. The term "Ripe Rot" is not truly applicable, as the disease may attack the young developing fruit. To the grower, however, it is most obvious on the ripening fruit. It hastens the period of ripening, and causes the fruit to fall prematurely, or if the fruit is attacked when quite young, the apples may harden and dry into a shrivelled state and remain hanging on the tree as mummies (Fig. 3).

The cause of the disease is a fungus long known as *Glœosporium fructigenum* (Berk.). This has been proved to be only one stage in the development of the fungus now known as *Glomerella cingulata* (Stonem), S. and von S. (=*G. rufomaculans* (Berk.), S. and von S.). This latter fungus represents a second stage (ascigerous), producing what are known as perethecia—cases containing numerous small sacs (asci), each containing eight spores. It is rarely found in nature, except in old dried mummies and cankers. This stage is not of great importance in the continuation of the life history of this fungus, although it may on occasion carry the fungus over the winter and start new infections in the spring.

The first stage (*Glœosporium*) is the common one. This grows on developing apples, beginning at any time during the summer or autumn, when conditions are favourable; from the time the fruit is formed, until, and after, it is ripe. It lives as a parasite in the bark, usually in injured areas known as "cankers." This fungus also grows on pears, quinces, stone fruits, bananas, tomatoes, passion-fruit, &c.

The mycelium grows in the tissues of the host, often penetrating deeply, and just beneath the surface it forms cushions of interlaced threads (hyphae). These masses push up the epidermis from below, rupturing it, and form a pustule visible to the unaided eye. The unopened pustule is black, owing to the dark colour of the hyphae. From the hyphae erect threads (conidiophores) arise, and towards their apices a crosswall is formed. A small part of each apex is constricted off, and separates as a mature spore or conidium. This process occurs repeatedly, all the

Fig. 1.—Open canker on an apple branch (*after Sorauer*)

Fig. 2.—Closed canker on an apple branch (*after Sorauer*)

Fig. 6.—Blossom Blight (*after Stewart*)

Fig. 7.—Twig Blight (*after Stewart*)

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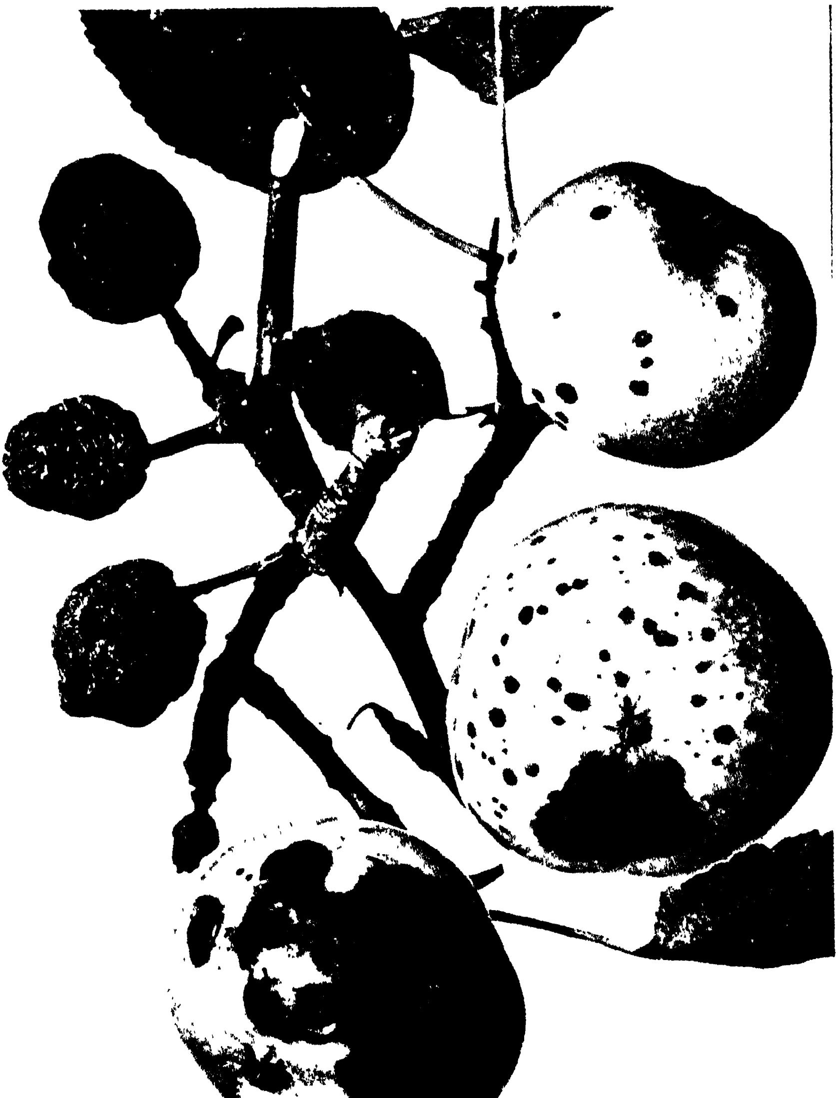

Fig. 3. Apples badly affected with Bitter Rot on the same twig with mummies of the preceding year's crop (*after Scott*)

conidia issuing from the pustules in a pinkish mass. Very often these spore pustules are arranged on the diseased area in concentric lines. The circular areas thus demarcated, blackish in colour, somewhat depressed, with their concentric rings of spore pustules and pinkish masses of spores, serve to distinguish this disease. The spores remain stuck together in a mass, and may dry into an irregular globule, sometimes retaining their vitality in this state for a long time (a year or more). They readily separate in water, and under suitable conditions quickly germinate by sending out one or more thread-like tubes, which carry on the infection. If the diseased apple is not invaded by other fungi and bacteria it may dry up into a shrivelled state, forming a mummy, the hyphae, conidiophores, and conidia drying, but retaining their vitality, and readily producing new spores in a few days if sufficient moisture is applied. These mummies thus become a source of infection in the next season.

On the branches, the fungus may form blackened sunken patches, and the bark may be killed, and crack and fall away. These canker spots may occur on small shoots, very often on the last year's fruit spurs, and also on branches up to many inches in diameter. (Fig. 4.) The fungus lives through the winter in these cankers, and from them infection may start in the new season, either from spores dried in the pustules, as on the fruit, or from fresh spores produced by the mycelium, which may live for a year or two in the canker.

With this knowledge of the life-history of the fungus, the first method of control is to remove the source of infection; no mummied fruit, therefore, should be left hanging on the trees; it should all be collected and burned. Any visible cankers on branches too large to cut out should be well scraped and painted over with a thick Bordeaux paste (1½ lb. copper sulphate, 1 lb. quicklime, 2 gallons of water). Smaller twigs and branches showing cracked and cankered areas should be cut away and burned. This is preferably done when all leaves are off the tree. Subsequently sprayings must be carried out to prevent fresh infection. In the early part of the season examinations should be made for any signs of infection of the fruit, and any necessary removals made promptly. Thorough sprayings with Bordeaux mixture should then be given, especially if the tree has not been previously sprayed. Failure to spray at this time may result in considerable attack. Bordeaux of a strength of 6 lb. copper sulphate, 4 lb. quicklime, 50 gallons water, is sufficient.

Phyllosticta Canker.

A disease known as "Apple Blotch" occurs in America, which produces blotches on the fruit, spots on the leaves, and cankers on the twigs. It is due to a fungus (*Phyllosticta solitaria*, E. and E.). We have found a *Phyllosticta* associated with cankers on apple twigs, and the effects are similar to the Apple Blotch fungus of the United States. The species here appears to be more like *P. prunicola*, which is commonly found on stone fruit, but also on the apple and fig in Australia. This causes the cracking

and peeling off of the bark, and exposure of the woody tissue of the twigs of stone fruit. On the apple twigs the surface becomes cracked, and the bark peels off in a similar manner. Numerous pycnidia of the *Phyllosticta* are found, producing spores which closely agree with *P. prunicola* (*Sacc*). The fungus also attacks the leaves, finally producing a shothole effect.

In America, Blotch fungus has been frequently found associated with Black Rot fungus (*Sphaeropsis malorum*), and in some cases fruit spurs have been killed by either fungus alone or by both together, the fungi having entered the fruit buds in the early summer. The same treatment as for the control of Bitter Rot is necessary, *i.e.*, prune out and burn all cankered twigs and spray with Bordeaux (6—4—50 formula).

Nectria Canker.

Nectria ditissima (Tul.) is a fungus that usually enters trees through wounds. In England it spread very much after Woolly Aphis became so prevalent. The bark is first attacked and destroyed, often cracking in a concentric manner. Afterwards the wood is destroyed, the canker often completely girdling small branches, which are then easily broken off by the wind. As a rule, a rugged callus forms round the wound, and frequently new canker spots appear on a branch at points where there is no evidence of external infection. This disease is common in New Zealand. In England, Massee states: "It is not going too far to state that if we had no American blight or Woolly Aphis we should have no epidemic of canker." Fig. 5 shows a *Nectria* canker from New Zealand, and it is desirable to exercise every care in New South Wales to prevent the introduction of the fungus here, especially as Woolly Aphis is so prevalent.

Blight (*Bacillus amylovorus* (Burrill) De Toni).

This disease has not yet been recorded in Australia, although young trees sent from here to Canada have been condemned at Vancouver as being affected by it.

The disease is a bacterial one, the specific organism being known as *Bacillus amylovorus*. It attacks the pear, apple, quince, and has recently attacked plum and apricot, and a few other trees. It is of American origin, and occurs in Canada, and practically over the whole of the United States.

The limbs, blossoms, twigs, and fruit may be attacked. In the nursery it is commonly found affecting the twigs. When affecting the blossoms (Blossom Blight) it is at once noticeable. The tufts of young blossoms become brown, and then black, and the disease extends into the fruit spurs. The wilted and brown or dead appearance of the leaves and twigs is characteristic of twig blight, and blighted twigs resemble green brush that has been only partially burned. There is generally a viscid, milky-white substance exuding in small drops on the surface of the twig or the petioles, and this darkens and hardens to a gum almost black in colour. The existence of the disease before any discoloration of the foliage takes place may be

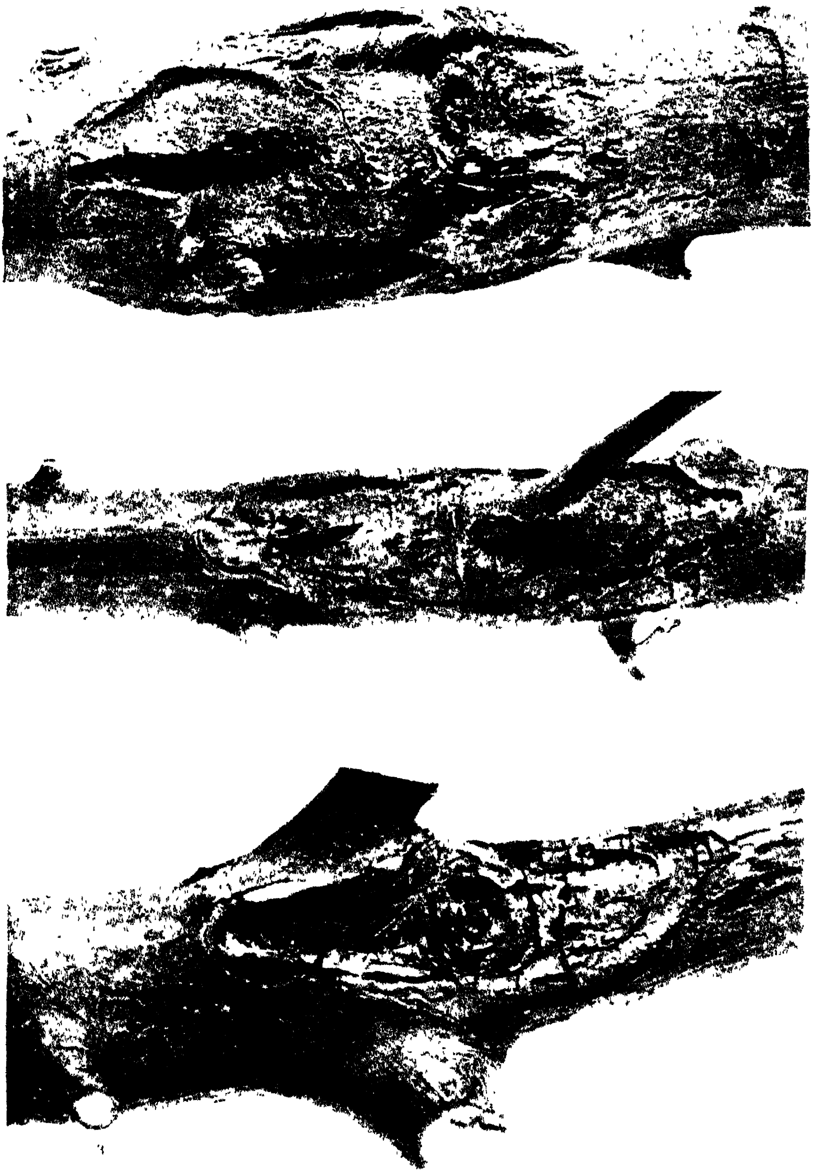

Fig. 4. Three limbs with Bitter-rot cankers (*after H. von Schrenk*)

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Fig. 5.—Apple canker (*Nectria ditissima*). Both half natural size.

determined by the sappy and juicy appearance of the tissues. A faint amber-yellow or reddish discoloration of the tip is often a means of detecting recently-affected apple shoots. In pear twigs, an intensive blackening of the tissues is usually characteristic even in early stages of the infection. The ultimate effects in all hosts are—the leaves shrivel, turn brown or black, and resemble foliage killed by frost. In no other disease of pome fruits do the leaves cling so tenaciously to the dead twigs. The blight often works down the twigs or branches into the trunk. The tissues darken, and the abundance of sap gives the bark a water-soaked appearance. The surface may become raised and blistered, and milky, gummy drops be exuded in such abundance that they flow down the tree. At the end of the season the diseased bark may shrink and crack, and a canker be formed, and here the blight organism may remain dormant till the next season.

Infection is mostly communicated by insects carrying the bacteria to the flowers, but infection through the leaves and twigs is also brought about by insects such as aphides and bugs, and also by the pruning tools.

The symptoms have been somewhat fully stated here, so that growers may be able to notify the Department should any suspicious signs of this disease be detected. We have been on the watch for this disease for some years, and it is quite possible for it to be introduced in nursery stock from the United States of America. (Figs 6, 7, and 8)

Mildew.

This disease first appears on the leaves as small scattered whitish patches, which may extend rapidly until the whole leaf is covered. It also attacks the young shoots. Little injury results when full grown foliage is attacked, but when the leaves are young and the tender shoots are infected the damage is very much greater. The tips of new shoots remain stunted, and covered with the growth. The white, felt-like appearance is due to the rapid growth of a fungus which covers the surface with its mycelium, and produces countless spores. This is the conidial or oidium stage, and may be the only one produced, but the fungus may produce another stage—the ascigerous one—when perithecia, with appendages, are formed. These contain a single sac or ascus, usually containing eight spores. The fungus probably passes through the winter by means of its mycelium hibernating in the bud scales. Leaves that are attacked often dry up later, and the disease is therefore sometimes referred to as "Blight" and "Fire Blight," a term likely to be confused with another "Fire Blight," which is a bacterial disease. This disease is also known as "Shoot Blight."

The correct determination of the fungus depends upon the perithecia and appendages, and there is much confusion in Europe, America, and Australia. The most destructive species in America is now stated to be *Podosphaera leucotricha* (E. and E.), Salm., while the European one is *P. oxyacanthae* (D.C.), De Bary.

In Victoria, McAlpine recorded the fungus as *P. tridactyla*, which Salmon regards as a form of *P. oxyacanthae*.

The best results in the control of this fungus are to be obtained by using lime-sulphur spray when the young buds are unfolding.

Crown Gall.

Crown gall is the term applied to abnormal outgrowths near the surface of the soil in the region of the collar of various plants. The name, however, is used for the disease whatever the situation of the gall on the plant. It is one of the diseases most recently traced to bacterial origin, the organism being now known as *Bacterium tumefaciens* (Smith and Townsend). The first isolations and inoculations were obtained in the United States in 1906, and the bacterium studied and named in 1907. It is remarkable for the great variety of plants that may be attacked; *e.g.*, in the United States it appears on apple and pear, all stone fruits, grapes, berries, walnut, beet, tomato, potato, tobacco, &c. In South Africa it occurs on apple, pear, quince, apricot, and peaches. It also occurs in Europe and South America, and in New South Wales we have had specimens of what is apparently Crown Gall on pear and peach.

The swellings, or galls, small at first, usually appear just below the ground line (crown), at or near the junction of the stock or scion in grafted plants. Ordinarily they are smooth, soft, spongy, white to flesh-coloured outgrowths, which increase in size, harden, and become rough and warty on the surface with age. As the galls enlarge, the function of the adjacent conducting tissue is interfered with, and the trees become stunted and dwarfed. Secondary galls often appear on the surface of the smaller roots, and less frequently on the plant above ground. In America the disease has been very serious in nursery stock, and it is likely to continue on plants when they are removed to the orchards. The disease is contagious, infection often taking place through wounds induced by grafting and by careless cultivation. In some plants, *e.g.*, the apple (Fig. 9), two types of gall may be produced—hard and soft—but no difference has been found in the causal organism. A very hairy-root condition has also been produced. The bacterium differs from many others that cause plant diseases in not producing cavities in the plant. It occupies the living cells in small quantities, causing rapid proliferation. It is thus the cause of plant cancers resembling possibly in some respects cancers in human beings. The cause and development of these plant growths is therefore of more than ordinary interest.

The rigid rejection of nursery stock showing any signs of such gall formation is the first means of protection. Care in cultivation not to wound the crown is important. Treatment of diseased trees cannot be relied upon to check the disease.

(To be continued.)

Fig 8. Cankered limb, showing exuding milky drops (*after Stewart*).

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Fig. 9.

Hard form of Crown-gall at the lower end of the scion in a root-grafted apple tree.

Hard form of Crown-gall surrounding the union in a root-grafted apple tree.

(*Both after Hedgcock.*)

The Hymenomycetes of New South Wales.

[Continued from page 888.]

J. B. CLELAND, M.D., Principal Government Microbiologist, and E. CHEEL, Botanical Assistant, Botanic Gardens.

5.—*Amanita strobiliformis*, Vittad.

Agaricus (Amanita) strobiliformis, Vittadini, *Fung. Mang.*, t. 9.
Cooke, *Handbook of Brit. Fungi*, p 8.
Cooke, *Illustrations of Brit. Fungi*, pl. 8 and 277.
Massee, *Brit. Fungus Flora*, vol. iii, p. 264.
Agaricus (Lepiota) ochrophyllus (?), Cooke and Massee, *Grevillea*, xviii, 2, pl. 178.
Cooke, *Handbook of Aust. Fungi*, No. 23.
Lepiota, sp., Cheel, Ann. Rep. Botanic Gardens, Sydney, 1910 (1911), 11.

"Pileus 5–8 in. across, flesh thick at the disc, thin towards the margin, firm, white, convex, then expanded, with a distinct pellicle, margin even, extending slightly beyond the gills, white, greyish, or yellowish-brown, warts large, angular or pyramidal, hard, closely adnate and persistent; gills rounded behind and free, broad, whitish; stem, 5–7 in. long, up to 1½ in. thick, solid. Floccosely scaly, expanding at the base into a subterranean bulb having 1–2 concentric, acutely marginate rings; ring superior, large, torn. Borders of woods, &c.

"Pileus when young subglobose, bulb of the stem conical below, rooting, its border sometimes incised all round, sometimes even, floccose above to the edge of the pileus, scales of the pileus large, wart-like, with a brown disc and white floccose border, at length falling off. Pileus when expanded 8 or 9 in. across, at length smooth; margin extending beyond the gills. Stem, 6–7 in. high, 1½ in. thick, firm, solid; bulb not properly scaly; veil large; gills rounded behind, the shorter ones denticulate at the base. Smell and taste at first slight, at length disagreeable. Too much stress must not be laid upon the incision of the bulb or its scales, for neither character is constant. (B. and Br.)"—Massee.

In the autumn an agaric, often of huge size, is common in numerous localities round Sydney. Its identification has given us much trouble, which has been added to by its pleomorphic features, and at first we placed it under *Lepiota ochrophylla*, with the plate of which in *Grevillea* some specimens agree closely. An examination, however, of many specimens in all stages of growth has forced us to place it under the genus *Amanita*. Our reasons for so doing are the following:—The cap in some specimens is densely covered with large, low, conical warts which can be removed by rubbing, usually with ease, though in some cases the warts seem embedded in the substance of

the cap; in those specimens in which the cap is smooth there are usually, but not always, more or less extensive adherent flakes, again easily removed by friction; in some young specimens, distinct evidence of the presence of two membranes can be detected, warts on the pileus being evidently continuous with volval-like remnants at the base of the stem whilst an unruptured veil has been present; and in many cases the bulbous base of the stem has shown incisions indicative of the remains of a volva. In our opinion, therefore, the species met with in Sydney should be placed amongst the receding members of the genus *Amanita*, in spite of the *Lepiota*-like characters of many individuals.

Many of our specimens agree with the description in Massee of *Amanita strobiliformis*, except in the pale buff or ochraceous tint of the gills. With one of the figures in Cooke's illustrations some of our specimens are indistinguishable. On the other hand, Cooke and Massee's description, presumably from notes accompanying dried specimens of *Lepiota ochrophylla*, together with its plate, would describe well our *Lepiota*-like specimens. We have therefore concluded to place, provisionally at least, our agaric under *A. strobiliformis*, and to include under this, with a question mark, *Lepiota ochrophylla* as a synonym.

Cooke and Massee's description of *Lepiota ochrophylla* is as follows:—"Pileus fleshy, convex, then flattened, obtuse, pale ochre, variegated with darker concentrical innate scales (4–6 in. broad); margin faintly striate; stem solid, erect, smooth, at length striate, fibrillose (7 in. long, 1 in. thick), bulbous and turbinate at the base, of the same colour; ring superior, pendulous, sometimes double; gills broad, attenuated behind, free, rather crowded, ochraceous, spores elliptical, 12 × 8μ. On sandy ground. Queensland."

The following is a description of some of our specimens (Plate II, Fig. 1, partly expanded):—Pileus campanulate when young, then expanded and sometimes slightly umbonate, finally slightly concave, up to 9¼ in. in diameter, pale fawn or biscuit colour to pale ochre. When young there are large adherent scales, fewer near the edge, becoming indistinct on maturity. The scales are sometimes mere flakes, at others coarse projecting warts. Remains of the veil may be attached to the edge of the pileus, finally leaving a fretted free margin, to which the gills do not extend. Gills crowded, white to cream, when old becoming ochraceous, free or just adnexed. Stem stout, up to 6 in. or more high, 1¼ to 1½ in. diameter above the bulbous base up to 2½ in. or even 3¾ in. at the base, conical downwards, solid, pale fawn or biscuit colour. Ring very prominent, about 1 in. down, dependent, double, striate, as is the faintly pinkish stem above it. Indefinite remains of the volva, sometimes hardly recognisable, forming pinkish-purple scaly remnants or lines on the turbinate base. In young specimens, such volval remains may be seen while the veil is still unruptured. In very young specimens, the turbinate base may be as large as the unexpanded cap. Spores white, oval, 10 to 11·5 × 7μ. Common round Sydney after heavy autumn rains on sandstone soils and very conspicuous.

The fungus when squeezed in the hand has a peculiar, somewhat phosphorous-like, smell. Specimens were mashed up with bran and given to pigs, but, apparently from the smell, these animals ate little if any of them, and no ill effects followed.

Bellevue Hill (W. Craigie), February, 1909; Mosman (A. N. Allen), April, 1909; Penshurst (E. C.), January, 1911; Hill Top (E. C.), February, 1911; Mount Wilson (A. G. Hamilton), April, 1912; Rookwood (A. G. Hamilton), April, 1913; Upper Lane Cove River (Miss P. Clarke), April, 1913; Neutral Bay (J. B. C.), April, May, 1913, and 1914; Milson Island, Hawkesbury River (J. B. C.), April, May, 1913 and 1914; Chatswood (Miss P. Clarke), April, 1914. Warted specimens:—(T. Steel), February, 1911; (A. G. Hamilton), April, 1914; Epping (Miss M. Flockton), February, 1911; Lake Illawarra (E. C.), April, 1912.

2.—*Amanitopsis*, Roze.

"Stem with a volva at the base; ring absent; remainder as in *Amanita*. The present genus differs from *Amanita* in the absence of a ring, and from *Lepiota* in the presence of a volva."—Massee.

6. *Amanitopsis vaginata*, Roze.

Amanitopsis vaginata, Roze, in Karsten Hattsv., 1, p. 7.
,, ,, Massee. *Brit. Fung. Flora*, vol. iii, p. 256.
Agaricus (*Amanitopsis*) *vaginatus*, Cooke, *Handb. Brit. Fungi*, p. 10. Cooke, *Illustrs.*, pl. 12 and 18.
Agaricus (*Amanitopsis*) *vaginatus*, Cooke, *Handb. Austr. Fungi*, No. 11.
Agaricus vaginatus, Bull, t. 98, 512.
Agaricus nivalis (white form), Grev., Scot. Cr. Fl., t. 18.

"Pileus 2–5 in. across, flesh rather thin, whitish; campanulate, then expanded, obtuse, glabrous, naked or rarely with fragments of the volva attached, moist in rainy weather, somewhat shining when dry, margin quite membranaceous and coarsely striate, colour variable, lead-colour, orange-rufous, whitish, &c.; gills free, ventricose, not much crowded, white or pallid; stem 4–5 in. high, ½ in. thick at the base, equally attenuated upwards, very soft and at length fragile, the entire surface broken up into squamules, hollow or with fine fibrils more or less occupying the cavity; volva entirely free from the stem, except a point at the extreme base; sheathing, lax, friable; spores elliptical, 10 x 7 to 8μ. Among grass, in woods, &c.

"Pileus 4 in. or more broad, plane, slightly depressed in the centre, scarcely umbonate, fleshy except at the extreme margin, which in consequence is elegantly grooved; viscid when moist, beautifully shining when dry; at first there are a few broad scales, the remains of the volva, but these soon vanish; the epidermis easily peels off. Gills free, ventricose, broadest in front, often imbricated, white. Spores white, round. Stem 6 in. or more high, ½ to 1 in. thick, attenuated upwards, obtuse at the base, where it is furnished with a volva which is adnate for about an inch and then, in general, closely surrounds it like a sheath, but sometimes the margin is expanded, marked within at the base with the grooves of the pileus, sericoe-squamulose, scarcely

fibrillose but splitting with ease longitudinally, hollow or rather stuffed with fine cottony fibres, the very base solid; not acrid, insipid; smell scarcely any. The volva is easily overlooked if care be not taken to dig up the very base of the stem, as it is apt to be entangled in the grass. It seems of various colours; the more general one is a mouse-gray. Bolton figures a tawny variety agreeing with *A. fulvus*, Schaeff., t. 94. Others are figured by Schaeffer of a bluish and bay hue. Batsch has a white and Heller a green variety (Berk.).

"White, pileus 2–3 in. broad, ovate in the volva, then convex, at length plane and subumbonate, the centre subochraceous, at first warty, then quite smooth. Flesh white, very thin on the margin. Gills subdistant, broad in front, narrow behind, entire. Stem 3–5 in. high, 3–4 lines thick, naked, stuffed with spongy fibres, bulbous at the base, with a constriction where the volva becomes free. Volva loose, persistent (Grev.). This applies to *Ag. nivalis*, Grev."—Massee.

Cooke (Handbook Australian Fungi, No. 11) records *A. vaginata* for New South Wales, Queensland, and Victoria. The spores are given as 10μ long, and it is stated to be edible.

The only specimens we have with certainty met with belong to the variety *nivalis*. Single specimens of this beautiful viscid, pure white fungus have been found by the roadside at Bulli Pass in April, 1914, and at Kensington, Sydney, in June, 1914. The former specimen may be described as follows:—Convex, 2 in. in diameter, pure white becoming olive-tinted in drying, slightly umbonate, periphery sulcate. Gills free, moderately crowded. Stem 3½ in., attenuated upwards, mealy above and fibrillose when this is rubbed off, slightly hollow towards the base. Volva loose, large, deep. Spores granular, with a large gutta, 12 x 8·5μ.

7.—*Amanitopsis pulchella*, Cooke and Massee.

Cooke and Massee, *Grevillea*, xviii, 1, pl. 176, fig. B.
Cooke, *Handbook of Aust. Fungi*, No. 15.

"Pileus convex, then expanded (1–2 in.), vermilion, clad with irregular deciduous whitish warts; margin saffron-yellow, faintly striate; stem somewhat hollow, white (2–2½ in. x ¼ in.); volva adnate, marginate, base ovate, bulbous; ring obsolete; gills free, ventricose, crowded, white, at length tinged with yellow; spores subglobose, 7–8μ. On the ground. Victoria."—Cooke.

This agaric is common round Sydney, and we have also met with it at Mt. Lofty, South Australia (July, 1914). The description of our specimens is as follows:—Pileus 1¼ in., almost plane, centre depressed, periphery splitting and striate, colour varying from saffron-yellow to orange, paling with age, a few adherent reddish-orange tinted and white warty remains of volva on cap. Gills pure white or cream, almost free. Stem expanding under the pileus, which may be streaked by the gill attachments, 1¾ in., pale yellowish. Volval remains friable, usually orange-tinted, edge usually definite but irregular, volva often hardly recognisable. Spores spherical, thick-walled, with a central "nucleus," white 7–9μ. (Plate II, figs. 2 and 3.) We have fed several specimens of this agaric to a pig without any ill effects, so the species is apparently not poisonous.

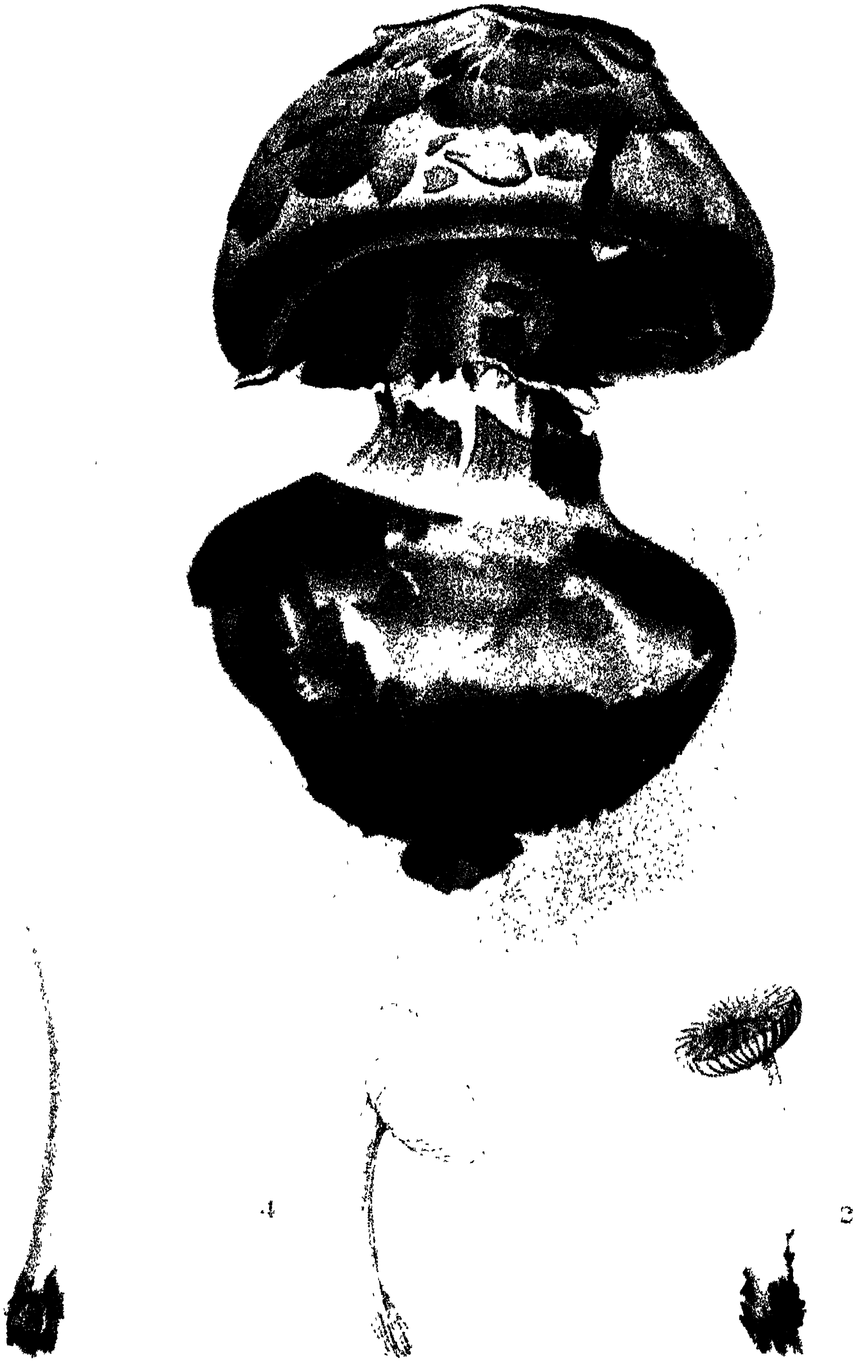


PLATE 2

1. AMANITA STROBILIFORMIS, HALF EXPANDED   2. AMANITOPSIS PULCHELLA
3. AMANITOPSIS PULCHELLA, SKETCH   4. LEPIOTA LICMOPHORA

This species is easily recognised by its bright yellow to orange cap, usually covered with a few white or orange-tinted warts, its white or pale yellow stem, the absence of a ring, and the volval remains (often indistinct) at the base.

8.—*Amanitopsis McAlpiniana*, n.sp.

The following species, of which a number of specimens have been obtained in one locality and which appears to be closely allied to *A. pulchella*, seems to be sufficiently distinct to warrant describing it as a new species. We have a water-colour of it in our possession, and have named it in honour of Mr. D. McAlpine, the premier mycologist of Australia.

Pileus about 1–2 in. in diameter, convex then expanded, slightly sticky, yellow to pale orange-yellow, covered with scattered mealy easily-removed warts, edge striate. As in *A. pulchella*, the hymenophore is not distinctly free. Gills cream-coloured, crowded, just adnexed or almost so Stem whitish, 2 in. long, hollow, sometimes solid, mealy, no trace of a ring, base bulbous, striate, volval remains at the base tinted as is the cap. Spores sub-spherical, granular, with a large gutta, 7 to 10·4μ.

The Storage of Explosives on the Farm.

H. ROGERS, Assistant Inspector of Agriculture.

DURING the past few years officers of the Department have conducted many demonstrations throughout the State in the use of explosives as an aid to agriculture. Farmers have taken up this work to a considerable extent, and therefore a few remarks on the storage of explosives are not only necessary, but should be of use in acting as a guide for future work. Several correspondents have made inquiries as to the requirements of the law on the question.

Under the Explosives Act, 1905, regulations have been issued, and persons acting contrary to these render themselves liable to heavy penalties.

Any person is entitled to keep explosives, such as gelignite, cheddite, &c., together with detonators, up to a total weight of 25 lb. For any quantity in excess of this amount, a magazine is necessary. According to the Act, premises used in this way are divided into three sections, according to the amount of explosive it is required to have on hand at any one time. For clearing and subsoiling a person does not, as a rule, require more than 100 lb. of explosive and detonators on hand, so that a license taken out under Division "C" should meet requirements. This license expires on the 30th September of each year, and is renewable; the cost is 10s. per annum.

Information concerning licenses under Divisions "A" and "B" for the storage of more than 100 lb. of explosive, can be obtained from the Explosives Department.

The Magazine.

This shall be of wood, iron, or other suitable material of sufficient size to hold the necessary amount of explosive (viz., about 100 lb.), fitted with a substantial brass-hinged door and padlock, and kept locked. It should be situated away from all inflammable material; in a paddock away from all buildings is the best place for it. The interior of the magazine should be lined so as to cover all exposed iron or rough, gritty portions.

The outside must be marked "Explosives" in a conspicuous place.

Detonators.

These must be kept in a box put together with brass screws, and have a brass-hinged door fitted with a brass padlock. This box must be kept in a building away from risk of fire, and must be marked "Explosives—Detonators."

Under no circumstances may detonators be stored with other explosives.

The local police are authorised to act as inspectors under the regulations. and may be applied to for any particular information required.

It is necessary for an inspector to certify that the premises comply with the requirements of the Act and the regulations in force thereunder before a license can be issued.

The Use of Explosives in Small Quantities.

While a magazine can be put together in a short time by any practical man, many people do not desire to have one on the farm. Under such circumstances arrangements could be made with one of the selling agencies to forward such quantities of explosive each week as would keep the total quantity below 25 lb. at any one time. This method involves much more expense in freight charges, and while some persons prefer to adopt it, it is not to be recommended, as the license fee is so low, and the cost of installing a "C" Division magazine is trifling when safety and convenience are concerned.

POISONING CROWS.

A CORRESPONDENT recently asked the Department for the best and easiest method of killing crows, which were eating the eggs at the poultry yard.

In reply, the Entomologist stated that there were many ways given for poisoning crows, but the commonest was to mix the strychnine with melted fat, and then spread it on a sheepskin or a piece of meat and place it where the crows could get at it. When taken in this way the fat melts in the bird's throat, and it cannot be vomited like meat or hard food.

Insectivorous Birds of New South Wales.

[Continued from page 970.]

WALTER W. FROGGATT, F.L.S.

47. The Nankeen Night Heron (*Nycticorax caledonicus*).

THIS is a common heron found not only all over Australia and Tasmania but also in New Zealand and ranging north as far as the Celebes in the Malay Archipelago.

In the early summer months, on the banks of the Murray River, near Gunbower, the writer has often roused out a dozen or more from the shelter of the foliage of the giant red gums, where resting with the head and neck bunched down on their shoulders, as long as they remained stationary, they were very easily overlooked in spite of their size. When flapping out into the bright sunlight they appear to be quite dazed, and soon seek the nearest shelter.

They are usually found along the banks of rivers or in the vicinity of swamps and lagoons, where just at dusk they fly out of their resting-place, and their harsh croak can be heard all through the night as they hunt along the banks or wade out into the mud hunting for crayfish, small frogs, crustaceans, and insects, their lance-shaped beaks being admirably adapted for pouncing upon all kinds of small fry.

There has been, and still is, the writer believes, a small colony of Nankeen herons in the brush in the old garden at Macleay House, Elizabeth Bay, from which they fly out in the evening and hunt over the foreshores of the bay through the night.

When nesting inland they build a stout nest of sticks in the larger trees among the swamps and lagoons, but on the coastal waters much less care is taken in the construction of their nests, and these are much smaller and more flimsy. The eggs, four in number, are a light bluish green, and the young nestlings for some time after they are hatched out are covered with dark down, which is spotted and striped with white. As they lose their baby clothes, however, they don the rich nankeen brown of the adults.

With the rich contrasting tints of back and breast, and the beautiful white occipital head plumes and bright yellow eyes, the Nankeen Heron is a handsome as well as a useful night hunter, and on account of both its value and beauty it should be protected from the pot hunter and the thoughtless boy.

48. The White-fronted Heron or Blue Crane
(*Notophoyx novæ-hollandiæ*).

Though correctly informed persons and naturalists call this bird the "White-fronted Heron," the bushman knows him as the "Blue Crane." He

cannot, however, be properly placed among the true cranes, which are all large birds of quite a different build, of which our Native Companion is the typical form in Australia.

This bird has an even wider range outside Australia and Tasmania than the Nankeen Heron, for beyond New Zealand it ranges through the Loyalty Islands, New Caledonia, New Guinea, and the Moluccas. It is common both on the low sandy beaches of our coast lands as well as around shallow swamps, lakes, and marshes inland. Always busy, running quickly over the grass and rushes or wading up to its knees in the muddy water it captures unwary crayfish, frogs, small crustaceans, and among them the small fresh water snail that is the host of the larval fluke before it infests the liver of the fluky sheep.* On the sand it gets many ground insects, and in the time of locust plagues lends a hand to the ibis and wood-swallows in destroying these grass-eating pests.

Its nest is a flat structure made of sticks and a little grass placed upon the horizontal branch of a tree usually overhanging the water, and contains four delicate bluish-green eggs, which in the writer's young days were looked upon as a prize by any collector of bird's eggs.

Like the Nankeen Heron, this graceful bird adds a charm to the landscape and is much more noticeable on account of its active daylight habits, and every one who watches a "Blue Crane" will see what a busy useful bird it is as it engages on its accustomed duties.

* Dr. Cobb asserts that the White-fronted Heron devours enormous quantities of *Bubinus*, the mollusc which serves as the host of the sheep-fluke. A single snail of this species will often harbour several hundred of the intermediate forms of the fluke. See The Sheep Fluke, by Dr. N. A. Cobb, *Agricultural Gazette*, July, 1897.

Seed Testing for Farmers.

The Department is prepared to test vegetable and farm crop seeds. Reports will be given stating the germination capabilities of the seed, its purity, and the nature of the impurities, if any.

Communications should be addressed to the Director, Botanic Gardens, Sydney. Not less than 1 ounce of small seeds such as lucerne, or 2 ounces of large seeds like peas, should be sent. Larger quantities are to be preferred. Seeds should be accompanied by any information available as to origin, where purchased, age, &c.

If a purity report only is desired, it should be so stated, to secure a prompt reply. Germination tests take from six to twenty days, according to the seed.

Approximately one third natural size.

INSECTIVOROUS BIRDS OF NEW SOUTH WALES.

"THE NANKEEN NIGHT HERON."

Nycticorax caledonicus

Two mature birds and a young one of the first year.

Approximately one quarter natural size

INSECTIVOROUS BIRDS OF NEW SOUTH WALES

"THE WHITE-FRONTED HERON OR BLUE CRANE."

Notophoyx novæ-hollandiæ, Lath.

Ash Concrete for Use on the Farm.

A. BROOKS, Works Overseer, Department of Agriculture.

PORTLAND cement concrete is an artificial compound, generally made by mixing cement, stone, sand, and water together in such proportions as will form a solid conglomerate.

To make the strongest and heaviest concrete, the stone must be hard, rough, and somewhat porous, affording a rough surface to which the cement mortar will readily adhere.

Technically the stone is called the aggregate, and the mortar made from the sand, cement, and water is known as the matrix.

For many classes of work, such as small farm buildings, cottages, floors, surface drains, &c., heavy concrete is not necessary, and for such purposes there are other materials that provide a suitable aggregate. Amongst these is the ash, generally a waste product obtainable from coke ovens, foundries, gasworks, and railway loco. sheds. This is generally found to be of a mixture that requires only the addition of the cement and water to make good concrete. Generally speaking, however, it is found desirable to add a proportion of sand, as it is always safer to have a little too much than too little matrix in the mixture. All materials used in the manufacture of concrete must be clean, and free from any vegetable matter.

Sand that is of a loamy nature, although good for mortar, is not suitable for concrete; for which purpose it should be sharp and gritty. The quality of the cement is assured, and may be procured with the certificate of the Government tester attached. Our local manufacture is equal in quality to the best imported cements, and for convenience is put up in bags containing about 128 lb. It would, however, be much more convenient if it were put up in bags containing exactly 1 cubic foot, as all concrete is mixed by measure. Until it is to be used the cement must be kept perfectly dry; as it is very sensitive to even slight moisture, it should be laid on planks or boards raised a few inches from the ground, so that the air can pass freely under it.

Often it will be found that a bag of cement out of the stack will have become apparently solid, from pressure only. This does not injure it in the least, as it is quite easily knocked into powder again; but if the hardening is due to moisture it is quite useless, not even fit to be broken up and used with the aggregate.

When water is added to cement it becomes pasty, and will remain so for about twenty minutes (if not exposed to the sun); after this time it begins to harden or set. To disturb it after this has taken place weakens the mixture, and to do so after it has set destroys it altogether. It should not, during the first five or six days after setting, be exposed to the hot sun or wind, but if possible be shaded and wetted at least twice daily. If this be done the concrete will be thoroughly hard all through; while if not, it will become chalky, easily damaged, and appear to have insufficient cement in the mixture.

Mixing Platform and Gauge Boxes.

Having selected the proper materials, the next step is to provide the plant and tools for mixing, and these should be just as carefully attended to.

For instance, it is of little use to have clean sand and water if the concrete is to be mixed up on the bare ground, where it is certain that the earth will be picked up with the shovels and mixed with the concrete.

It is absolutely necessary to have a clean wooden floor or platform for mixing on, and this may be of boards from 1¼ inches thick and about 9 inches wide, laid solid on a thin bed of sand, and close at the joints. If the boards are a little open they should be filled up with a poor quality of mortar before the mixing is started. On one side and end of the platform a board, say 6 inches wide, should be set up on edge to prevent the materials spreading off the boards.

A handy size for ordinary work would be 10 or 12 feet long by 8 feet wide, and it should be laid level on the surface, and as handy to the work as possible. To ensure the correct proportions of materials in each batch guage boxes should be made of the size to hold the quantities specified for each mixing. These boxes should have sides and ends only so that they can be lifted, and allow the contents to fall out on to the platform.

Water Supply.

A good water supply is absolutely essential, and where it cannot be laid to a point near the mixing board by means of pipes from a storage tank, it should be in an open-top tank sunk into the ground, so that the water can be dipped out with buckets.

Miscellaneous Tools.

In addition to the mixing board and the measuring boxes, the following tools are required for hand mixing:—

Two No. 3 square-mouth shovels;
one deep-bodied wheelbarrow;
one garden rake;
two 2-gallon water buckets;
one 4-gallon watering-can;
and light rammers for packing the concrete.

Where the water is laid on, a length of rubber hose is useful.

Method of Mixing.

The ashes should first be measured on to the board, and the heap spread out to about 3 or 4 inches thick. Then the sand and cement should be mixed together separately, and afterwards spread over the whole area of the ashes. The whole should then be turned over in shovel-loads, and as the shovel is turned it should be dragged towards the feet of the mixer, which causes the materials to be more properly mixed (and it may be mentioned that concrete cannot be too well mixed). Usually the materials are turned over twice while dry and twice while being wetted. The watering is best done by means of the watering-can, although this requires an extra hand on the board, and

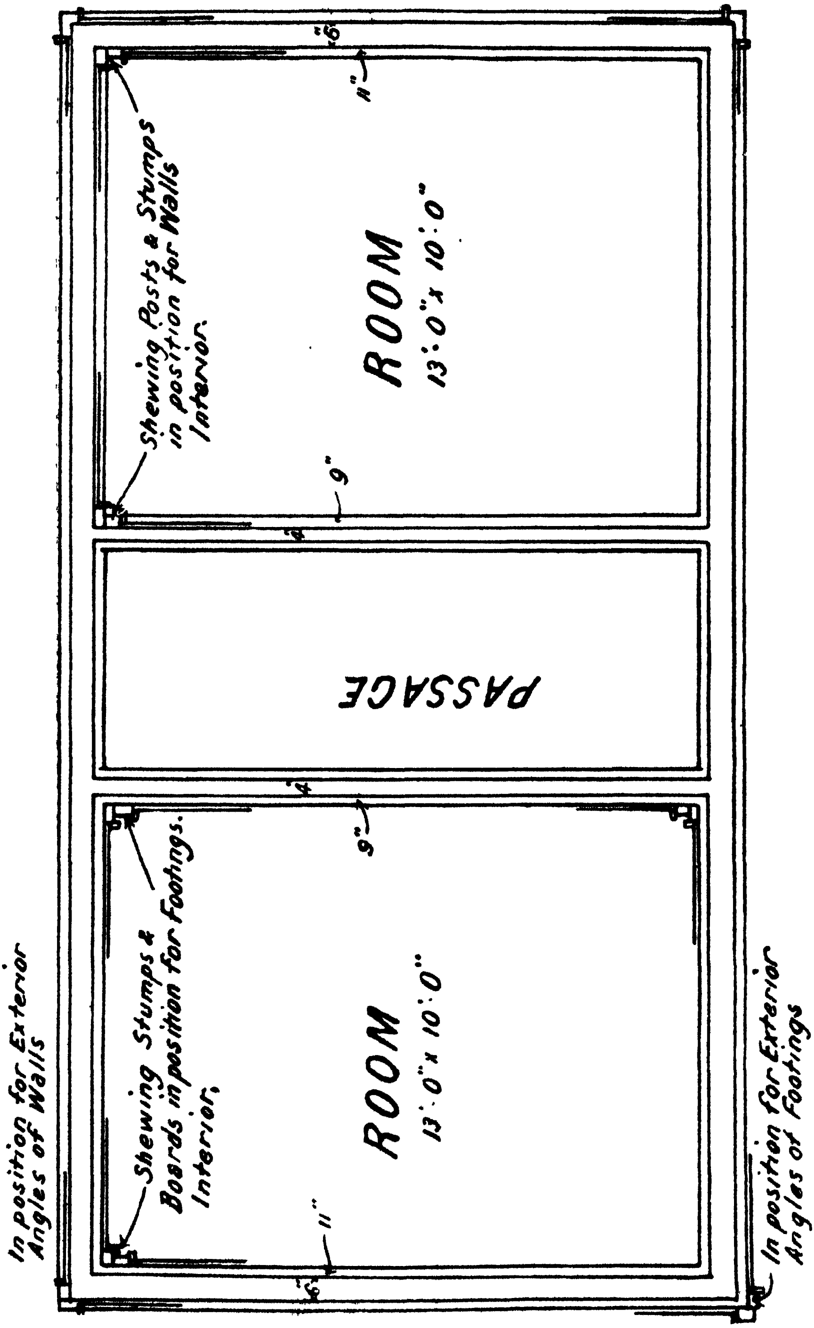


Fig. 1 —Plan showing position of stumps, posts, and boxing ready for concrete.

ASH CONCRETE FOR USE ON THE FARM.

to do the mixing properly three hands are required. There are a number of different machines in use for mixing concrete, but it does not pay to use them unless the job is a large one.

When mixed the concrete should be loaded into the wheelbarrow, taken to the work, and carefully placed in the moulds, or wherever it is to be used and lightly tamped in.

Consistency of Mixture.

Ash concrete should not be made too wet, but just enough to make it pack solidly together, by using the rammers lightly, when it will be noted that the water will come to the surface. A fair idea of the correct consistency may be had if a handful is pressed and retains its ball-like shape when the pressure is released.

Forms or Moulds for Concrete.

Concrete is a plastic material, and before it hardens takes the shape of anything against which it is placed, so that the making of the forms or moulds is a most important item in the success of the job.

Almost any material that will support its weight will serve as a form. For instance, in trenches made for foundations it will be found that the earth sides are sufficient to hold the concrete up to the ground line.

When an extremely smooth finish is desired galvanised iron is used, and these are more easily cleaned and last longer than wooden moulds. But timber is more often used, and where we require scantling sizes for the frame-work of roofs and ceilings, and boards for the floors, these can be used to build the forms with, and afterwards used for their special purpose. In this way there is no extra cost for material for the forms.

They should be correctly planned and carefully made, and with good joints, otherwise difficulties will be met with when they have to be taken down.

For ordinary work, such as the walls of cottages, dairies, stables, &c., there is no necessity for any heavy framing, but simply studs at each corner and angle of the walls, so placed as to form guides for the ends of the boards to slide between. On the lower ends of these studs a short piece is attached, forming a break, equal to the projecting distance of the footing course beyond the walls.

Where the building is only a small one, such as a separating room for a dairy, this may be omitted, and the studs put straight into the ground, in which case when the frame is removed holes the size of the studs will be in the foundation, which can afterwards be filled up; but for larger buildings the foundations should not be so cut into.

The accompanying plans (Figs. 1, 2, and 3) show the arrangement of the framing and the details of the construction suitable for the erection of farm buildings or cottages.

It may be here stated that where the boards are being shifted as the work proceeds the surfaces must be cleaned of any cement that may adhere to them, and the same applies to all tools used in the work. Nothing is better for this than an old dandy brush from the stable.

(To be continued.)

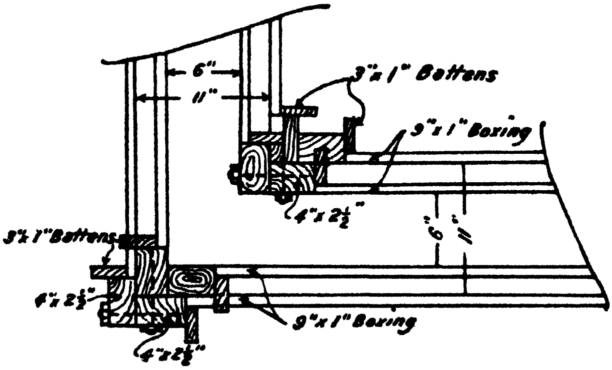


Fig. 2.—Plan showing posts, stumps, &c., at interior and exterior angles.

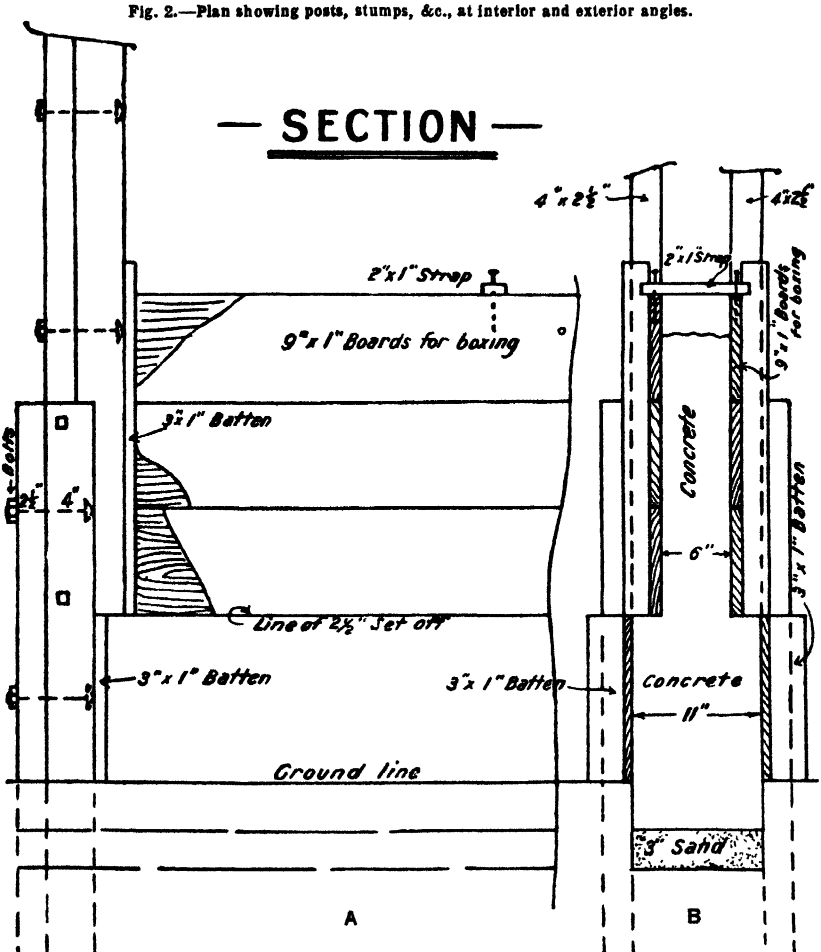


Fig. 3.—Showing A, exterior elevation at angle, and B section.

Home-made Rennet Extract.

MATTHEW WALLACE, Dairy Instructor.

[In view of the possibility of a shortage of the commercial brands of rennet extract the following method of preparing the home-made article may be found of service.—Ed.]

The process of making rennet extract begins with the saving of the "vells." This is the name applied to the fourth stomach of the calf, and is obtained when calves which are still being milk-fed are slaughtered.

The method of preserving the vell is as follows:—When the calf has been killed procure the fourth stomach, and after emptying the curdled milk away turn the stomach inside out and rub liberally with salt; turn it again to its normal shape and again rub salt on the outside.

One end is then fastened by a string, and the vell blown up in the same manner as a bladder, and the other end fastened. The vells are then hung up, and when thoroughly dry are fit for use.

In some cases the vell is filled partly with salt after having the curdled milk emptied out, the two ends fastened with a skewer, and hung up to dry.

In making the extract the best vessel to use is either one of glazed earthenware or an enamel-lined dish. Before using, the vessel must be thoroughly cleaned and scalded. Cut the vells into fine shreds, and place in the vessel; then add 1 gallon of water which has been boiled (and then cooled) and also 1½ lb. of fine salt to every four vells. Allow to stand for ten days, stirring frequently meanwhile; then strain off and bottle.

The straining is very important; several thicknesses of cloth should be used, and the liquid poured through several times.

If the vells are partly filled with salt when preparing them it is not necessary to add salt to the water when making the extract.

The extract should be dark in colour, but not cloudy. It should have a distinct brine-like smell, but should not be offensive.

Rennet extract made in this way will be, on the average, about half as strong as commercial brands of rennet extract. The strength should always be tested against some standard brand.

It is inadvisable to make home-made rennet extract in large quantities, as the freshly-made product is always the best.

Hot water must not be added to the vells or the extract will be spoiled.

Summary.

1 gallon of water which has been boiled and cooled,

4 vells,

1½ lb. of fine salt.

Bottle off in ten days.

Molasses Meal for Dairy Cattle.

EXPERIMENTS AT HAWKESBURY AGRICULTURAL COLLEGE.

H. BARLOW, Dairy Instructor.

[The publication of these results is authorised by the Experiments Supervision Committee. While the conclusions cannot be considered final, they should be of value, as indicating the limitations of molasses meal as a feed for dairy cattle.—ED.]

THE following experiment was conducted at Hawkesbury Agricultural College early in this year, to test the suitability of molasses fodder for milch cows in dry weather.

The ration agreed upon for the trial by the Dairy Expert and the Chemist was the following:—

15 lb. lucerne hay or chaff.
10 lb. wheaten chaff.
4 lb. bran.
7 lb. molasses meal

This ration was reduced in actual practice to—

12 lb. lucerne chaff.
8 lb. oaten chaff.
4 lb bran.
7 lb. molasses meal.

The molasses meal experimented with was a product containing 80 per cent. molasses together with 20 per cent. pith of the sugar-cane. The following analysis of a sample of it is provided by Mr. F. B. Guthrie, Chemist: –

Moisture	=	18·3	per cent.
Ash	=	8·8	"
Fibre	=	9·3	"
Ether extract (fat or oil)	=	0·4	"
Albuminoids	=	8·4	"
Carbo-hydrates (sugar and digestible fibre)	=	54·8	"
		100 0	
Nutritive value	=	64·	
Albuminoid ratio		1 to 6½	

Feeding Experiment.

Object.—To test the suitability of "molasses meal" to make up a palatable ration for dairy cows in dry weather.

Six cows were selected and fed the same ration as the general herd, *i.e.*,—

40 lb. green maize (chaffed).
5 lb. lucerne chaff.
2 lb. bran.

The cows were kept in a paddock practically free from grass, so as to compel them to rely solely on the ration feed.

The milk from each cow was weighed at each milking, and after the first four days it was tested, both morning and evening, for five days in the week for butter fat and total solids.

This was continued up to 10th March, covering a period of sixteen days. The average daily results during this preliminary feeding were:—

Cow's No.	Milk per Day.	Butter Fat.		Total Solids.	
		Morning.	Evening.	Morning.	Evening.
	lb.	per cent.	per cent.	per cent.	per cent.
6	23·5	3·4	4·3	12·08	12·58
7	27·7	3·7	3·8	12·5	12·86
15	22·0	3·2	4·1	11·73	12·58
58	18·0	3·6	4·0	12·09	12·716
172	25·5	4·05	4·5	12·39	12·94
335	33·2	3·0	3·8	11·41	12·376

On 11th March the ration was changed to the ration first mentioned, which was fed in a damp condition, but as the ration seemed rather too much for the cows selected, the amounts were reduced by omitting 3 lb. lucerne chaff and 2 lb. oaten chaff.

For the first two days the cows did not seem to like the change, being inclined to leave most of the food, but afterwards they all ate well.

The cows were kept in the same paddock, and the milk was weighed and tested as previously.

The test was continued for twenty-four days with the following results:—

Cow's No.	Milk per Day.	Butter Fat		Total Solids	
		Morning.	Evening	Morning.	Evening.
	lb.	per cent.	per cent.	per cent.	per cent.
6	23·1	3·8	4·2	12·67	12·79
7	27·8	3·8	4·4	12·37	13·11
15	24·6	3·3	4·1	11·98	12·90
58	20·7	3·8	4·3	12·26	13·11
172	25·7	3·6	4·4	12·19	13·02
335	34·1	2·9	4·0	11·24	12·39

YIELDS of Individual Cows during the four several periods of eight days each.

		Morning.			Evening.		
	No.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
		lb.	p. cent.	lb.	lb.	p. cent.	lb.
Check ration—One week.	6	111	3·5	4·54	80	4·5	4·24
	7	138	3·7	5·97	87	3·8	3·86
	15	113	3·2	4·21	77·5	4·0	3·62
	58	96	3·5	3·92	62	4·1	3·05
	172	108	4·2	5·32	77·5	4·5	4·10
	335	154	3·0	5·36	128	4·4	6·62
		720	...	29·32	512	...	25·49
Test ration (decreased)—First week.	6	108·5	3·7	4·69	78·5	4·2	3·86
	7	139	3·8	6·18	85·5	4·6	4·62
	15	115·5	3·3	4·43	82·5	4·2	4·06
	58	98·5	4·0	4·61	66·5	4·3	3·35
	172	120·0	3·6	5·05	85·0	4·5	4·50
	335	154·0	2·9	5·18	127·5	4·4	6·60
		735·5	...	30·14	525·5	...	26·99
Test ration—Second week.	6	110	3·6	4·64	72	4·0	3·37
	7	132	4·1	6·35	86	4·5	4·55
	15	120	3·5	4·90	79	4·1	3·89
	58	96·5	3·8	4·28	64·5	4·1	3·17
	172	118	3·7	5·11	96·5	4·2	4·75
	335	158	3·0	5·40	118·0	3·8	5·25
		734·5		30·68	516	..	24·98
Test ration—Third week.	6	110	3·5	4·49	75	4·5	3·97
	7	136·5	3·6	5·74	88	4·3	4·44
	15	110	3·2	4·10	77·5	4·1	3·81
	58	102·5	3·6	4·31	69·0	4·3	3·48
	172	112·0	3·6	4·71	85·5	4·4	4·41
	335	143·0	2·8	4·65	118·5	3·9	5·41
		714	..	28·00	513·5	.	25·52

With regard to the amount of milk yielded, it will be noted that, with the exception of No. 6, each cow improved slightly. In the matter of butter fat, although Nos. 15 and 172 were slightly lower, the general tendency was to improve, and the total solids also showed a tendency to improve, with the exception of Nos. 172 and 335.

The slight increase in milk may have been helped by the fact that heavy rains had fallen just before the beginning of the test, and the grass was beginning to "spring" during the last few weeks; the cows thus had a small amount of picking to aid the ration. All the cows were apparently in good health during the test and afterwards.

The test shows that the molasses meal is palatable and can be used without any ill effects; otherwise the results do not prove that it is of any special value.

A comparison of the two rations shows that the second is much more complete and expensive, and it also incidentally furnishes rather an interesting proof of the value of such a cheap fodder as green maize for feeding.

To enable a comparison of results to be formed on a commercial basis, the following values have been taken for the different foods used:—

	£	s.	d.	
Green maize	0	10	0	per ton.
Bran	5	0	0	,,
Lucerne chaff	3	10	0	,,
Oaten ,, ...	4	0	0	,,
Molasses meal	3	10	0	,,

On the basis of these values, during the eight days before using molasses meal, the six cows consumed—

	£	s	d.
1,920 lb. green maize	0	8	7
240 lb. lucerne chaff	0	7	6
96 lb. bran	0	4	10
	£1	0	11

During each week the cows were fed with the test ration they consumed—

	£	s.	d.
576 lb. lucerne chaff	0	18	0
383 lb oaten ,, ...	0	13	9
192 lb. bran	0	9	7
336 lb. molasses meal	0	10	6
	£2	11	10

From the accompanying Table, which shows the cost of the food in each week and the value of the product, it will be seen that, from an economical point of view, where the object is to supply cream for butter-making, the second ration is not to be considered when a crop like green maize is procurable at a reasonable figure.

If the aim is to supply milk for consumption as such, the returns would be higher.

TABLE showing cost of Food consumed, and Value of Production.
Periods of eight days each.

	Gallons of Milk produced.	Cost of Food consumed.			Value of Milk, at 7d. per gallon.			Credit Balance.			lb. of Butter produced.	Value of Butter, at 11½d. per lb.			Credit Balance.		
		£	s.	d.	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
Check ration	123	1	0	11	3	11	9	2	10	10	54·8	2	12	5	1	11	6
Test ration—																	
First period .	126	2	11	10	3	13	6	1	1	8	57·13	2	14	8	0	2	10
Second period ...	125	2	11	10	3	12	11	1	1	1	55·66	2	13	4	0	1	6
Third period ..	122½	2	11	10	3	11	5	0	19	7	53·5	2	11	3	0	0	7*

* Debit balance.

Scientific Dairy Instruction.

M. A. O'CALLAGHAN.

DURING the past six months, short schools of instruction have been held at the following centres :—

Gloucester.	Albion Park.	Port Macquarie.	Murwillumbah.
Lismore.	Singleton.	Leeton.	

These schools of instruction lasted one week, and at the end of the week an examination was held in the grading of cream, and in the testing of milk and cream. Demonstrations were also given at several of these centres in the neutralisation and pasteurisation of cream, and the whole basis of cream grading and pasteurising was thoroughly covered by a series of lectures and demonstrations, including the bacteriological aspect of cream grading and pasteurising. It goes without saying that, as the standards of the different qualities of butter for export are uniform throughout the State, cream grading—to be on sound lines—must also be on a uniform basis, and must be in accordance with the grades of butter as recognised by export standards. For this reason, it is very desirable that the principal instruction in cream-grading should be given by one individual, and consequently this had to be undertaken by the writer.

The members of the Field Branch of the Staff have attended at these schools, and have—in company with factory managers—graded creams daily, as it is important that all dairy instructors should be as uniform as possible in their standards of cream classification.

Whereas a good many have succeeded in passing the necessary examination in cream grading, the percentage of passes is small as compared with the number of those who presented themselves for examination. This is only to be expected, because many of those who presented themselves had, previous to attending the school of instruction, no definite training in cream fermentations or cream classification. It was found that most of those who had attended a previous school of instruction succeeded in gaining a certificate at the second trial.

Following is a list of those who have obtained certificates at the above schools :—

MILK AND CREAM TESTING, AND CREAM GRADING.

Mr. J. D. Day ..	... Leeton.	Mr. F. B. Dingle	Taree.
Mr. W. H. Andrews ..	Tyalgum.	Mr. A. Bennett	Coff's Harbour.
Mr. W. Atkin ..	.. Uki.	Mr. Geo. Rowe	. Fredericton.
Mr. F. J. Wenham	.. Lismore.	Mr. J. Pigott .	. Comboyne.
Mr. C. Barber .	.. Alstonville	Mr. C. S. Hawker	Red Range.
Mr. C. H. Fraser	.. Lismore.	Mr. Geo. Lyons	. Singleton.
Mr. R. E. Higgins	. Jones' Island, Manning River.	Mr. W. P. Lawlor	Glen Innes.
		Mr. R. G. Moore	.. Branxton.
Mr. S. J. Huxley	.. Milton.	Mr. F. L Napier	. Stroud.
Mr. H. Noble ...	.. Dyer's Crossing.	Mr. C. Parker .	. Wingham.
Mr. J. D. Wiese	.. South Africa.	Mr. C. J. Cooke	.. Murwillumbah.

MILK AND CREAM TESTING.

Mr. Atkinson...	... Yanco Experiment Farm.	Mr. W. Brorson	... Nimbin.
Mr. J. Aikins ..	.. Albury.	Mr. I. G. Chittick	... Binna Burra.
Mr. C. de P. Hitchcock	Leeton.	Mr. H. J. Bryen	... Barrengarry.
Mr. A. Rothwell	.. Cowra.	Mr. J. Blanchfield	... Jamberoo.
Mr. W. H. Smith	... Crookwell.	Mr. S. Graham...	... Jamberoo.
Mr. T. Kearney	... Albury.	Mr. G. J. Timbs	... Dapto.
Mr. R. Kenyon	... Murwillumbah.	Mr. J. C. Graham	... Albion Park.
Mr. J. McLatchie	... Byron Bay.	Mr. N. Russell...	... Yatte Yattah.
Mr. L. H. Cox	... Bangalow.	Mr. W. Somerville	... Berry.
Mr. T. K. Ferguson...	Corndale.	Mr. H. Reynolds	... Port Macquarie.
Mr. J. C. McKenzie...	Byron Bay.	Mr. P. J. Lambert	... Raymond Terrace.
Mr. R. Hargreaves	... Condong.	Mr. R. F. Smith	... Scone.
*Mr. S. Martin	... Murwillumbah.	Mr. H. W. Plummer	... Singleton.
Mr. V. Page ...	... Kyogle.	Mr. F. Hatcher	... Branxton.
Mr. R. Dobson	... Alstonville.	Mr. L. A. Watson	.. Gunnedah.
Mr. W. Williamson	... Grafton.	Mr. J. M. Wratten	... Gloucester.
Mr. E. W. Stanger	... Nimbin.	Mr. C. Burges...	.. Dungog.
Mr. W. S. Smith	... Coramba.	Mr. M. Pretty...	... West Maitland.
Mr. P. C. Darville	.. Lismore.	Mr. E. W. Lukins	... Unanderra.
		Mr. F. Carrick .	... Tamworth.

CREAM GRADING.

Mr. A. S. Cooke	... Lismore.	†Mr. J. Searl . .	... Singleton.
†Mr. W. F. Heydon	... Bowraville.	Mr. J. Tobin ..	... Singleton.
†Mr. J. J. Steele	.. Port Macquarie.	†Mr. G. H. Chapman	. Gloucester.
†Mr. R. A. Napier	... Macksville.		

CREAM TESTING.

Mr. D. Cameron, Coraki.

MILK TESTING.

Mr. W. Spring, Sydney

* Passed in cream grading previously. † Passed in testing previously.

"HATCHABILITY" OF EGGS.

EXPERIMENTS have been in progress at West Virginia Agricultural Experiment Station, United States, to discover some of the factors affecting what is called the "hatchability" of eggs. A previous series of experiments had shown that chickens hatched from heavy eggs are heavier and more thrifty than those from lighter eggs, and the object of the series now under notice was to ascertain at what season of the year the heaviest eggs are laid. It was found that the eggs laid in one pen of pullets averaged 40·4 grams each at the beginning of the winter, and that there was a gradual increase until the early part of spring, when they averaged 59·6 grams each, after which there was a gradual decrease until the autumn, the average for the last month being 55·7 grams. Two other pens followed a similar curve, and the spring thus appears to be the time when the heaviest eggs are laid. The reason for this may not be clearly evident, says the Bulletin that records the results, "but it certainly throws additional light on the subject, and explains why early hatched chickens are almost universally considered more hardy and vigorous than those hatched later in the season."

In incubator and brooder tests, it was observed that after fowls have been laying heavily for a considerable length of time, the eggs were less fertile and did not hatch so well as eggs laid by fowls that were just reaching or had reached their maximum egg production for the season.

Asparagus Culture.

A CORRESPONDENT recently asked for general cultural details regarding asparagus, and also for some particulars concerning the canning of that vegetable.

The following reply by Mr. A. J. Pinn, Inspector of Agriculture, supplements the information furnished by Mr. R. W. Peacock, Manager of the Bathurst Experiment Farm, in the August, 1912, issue, to which readers are referred.

The Canning of Asparagus.

So far as I am aware, the canning of asparagus in this State has never been attempted on a commercial scale. One grower at Bathurst planted 10 acres with the intention of canning, but the demand for the fresh product was so great, and the prices so good, that the original intention of the grower was not carried into effect.

The crop is grown largely in California and other States of the United States for canning purposes, and the product is harvested as "white grass," the sticks being cut just as the heads peep through the surface of the soil. In New South Wales the demand is almost wholly for "green grass" for ordinary culinary purposes, but if it is intended to can the product it will be necessary to grow for "white grass." The colouring is regulated by the amount of the covering over the crown of the plant, as wherever the plant is exposed to the light it rapidly attains a green colour.

The prices on the open market in the United States of America are 2½ dollars (about 10s.) for fancies, 1½ dollars (about 6s.) for primes, and 80 cents (about 3s.) for culls, per dozen bunches.

The canneries (usually in close proximity to the fields) pay 14 dollars for No. 1 grade and 7 dollars for No. 2 grade per 100 bunches, equivalent to about 6¾d. and 3¼d. per bunch respectively.

The crop is sometimes sold loose to the canners by weight. This is the most profitable way for the grower to sell, as the expense and labour of bunching are eliminated, and the price obtained is almost equivalent to that for bunched "grass." A bunch of asparagus weighs from 2 to 2½ lb. Bunches vary somewhat in size, chiefly in length, but the standard size is 8½ inches long, containing 30 spears. Bunches for canning are 7½ inches long, and are cut to 6⅞ inches before canning. Each can contains 1½ lb. of "grass."

Cultivation of the Crop.

The most suitable soil is sandy, with a clay subsoil to retain moisture River-flat land which is moist and well drained is considered ideal. The land should be liberally top-dressed with well-rotted farmyard manure which should be ploughed in deep. The crop responds well to irrigation.

Where roots are used those one year old should be planted, but it is considered that the French method of growing from seed is more economical. The system is as follows :—

After the land has been ploughed and cultivated strike out furrows from 5 to 6 feet apart, according to the richness of the soil. The ploughing should be deep—up to 12 inches if possible—and it is preferable to plough twice in the one drill, throwing a furrow each way from the centre of the row. Then work a single-horse cultivator (closed up) in the bottom of the furrow, to loosen the soil in the bottom of the drills.

Make hills 20 inches apart in the furrow, mixing the soil of each with a shovelful of well-rotted fine manure. Sow four or five seeds in each hill, and cover lightly with good soil. The hills should then be watered and kept moist until germination, which will take about three or four weeks After germination the plants should be thinned out, leaving only the strongest plant in each hill.

Keep the soil loose and free from weeds, and as the plants grow well-rotted manure and soil are applied, a few inches at a time, round each. The filling-up goes on steadily (care being taken not to choke the plants) until the drills are filled.

Where one-year old roots are planted, they should be treated in the same manner, covering with about 2 inches of soil, but care should be taken to keep the crown of the root upward, to spread the roots well, and to press the lateral roots firmly into the soil whilst covering.

Cultivate between the rows during summer, and in the winter the top growth should be cut down and burnt. The cultivation of the second and third year will be to plough a light furrow over the crown early in the spring, to remove the old dead stumps. The furrows are filled with well-rotted manure, and the beds are then harrowed.

The plants are allowed to grow, and should be kept well cultivated, and free from weeds. The cutting and burning of the top growth should be repeated in the winter.

It is preferable not to make a cutting till the fourth spring, and a full cut is not advised until the fifth season.

When in full bearing a top-dressing of rotted manure and fertiliser is recommended, immediately after the cutting has been completed. This will assist the plants considerably in forming up strong crowns and healthy buds, which produce the crop during the following season. Early in each spring the beds should be cleaned, cultivated, and dressed with manure, as described in Mr. Peacock's article already referred to.

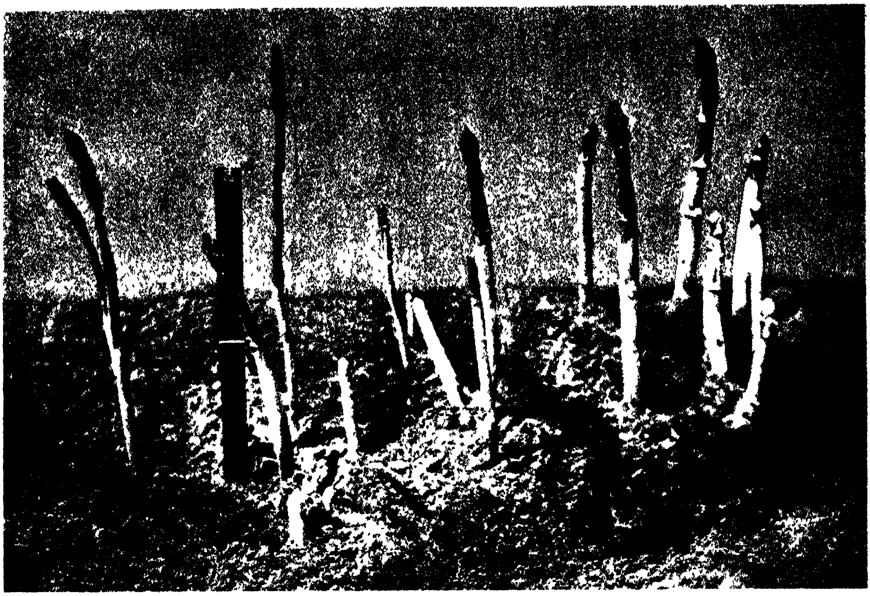
Asparagus Culture in the Goulburn District.

The growing of this crop has proved a very profitable side-line to orcharding in the Goulburn district, where Mr. F. Stone has an area of a little over half an acre, from which he obtains a return of about £100 per season. The asparagus is planted in single rows midway between the rows of trees, and the beds are now a few feet wide. The soil is of a sandy character,

A heap of Asparagus before grading and packing.

Two grades of "Primes." Long Green and Short White.

ASPARAGUS CULTURE



A prolific Plant.

The growth from a 14-year old plant. The earth has been scraped away to show the number of shoots since the cut two days previous.

Asparagus at Mr. Edward Twynam's, Goulburn.

This was an old bed in 1868, and is still thriving. The shoots are 4 feet high and over.

and very suitable for the growing of such a crop. The position is an ideal one for the purpose, being elevated, well sheltered, and having a north-easterly aspect. The cutting season extends from September to December, but this season the first cutting was made towards the end of August.

The asparagus is cut in the morning and the "grass" is graded, bunched, and packed during the afternoon, so that the produce is on the Sydney market early the following morning. The grower is very careful with the grading, and always secures top prices for the produce. The third grade "grass," which consists of the finer sticks, finds a ready local market at good prices, and only the prime quality is forwarded to Sydney. At time of writing the wholesale price secured per gin case, as illustrated, was 25s. per twenty-one bunches, of a gross weight of 56 lb.

Both white and green "grass" are grown. As to their relative values there is much controversy, but each kind has its adherents. In this State the green "grass" is the most popular, and in the opinion of many, is superior to the white, being more tender, and providing a larger edible proportion.

The bunches, when tied, are tightened by pushing a few extra sticks into the bunch. After tying, the bunches are placed upright in shallow trays of water, in order to keep fresh, and each bunch is carefully scrubbed clean with a brush before packing.

When packing into boxes, moistened paper is placed at the butt of each bunch, and each layer of bunches is separated by a sheet of moist paper; consequently the asparagus arrives at its destination in a very fresh condition.

Asparagus-growing near Sydney.

A considerable quantity of asparagus is grown in the metropolitan district, chiefly in the vicinity of Mascot, where the soil is of a sandy nature. The crop is also grown in the Gosford and Camden districts with good results.

At Mascot the asparagus is planted in single rows either 3 feet or 4 feet apart, but these distances are considered too close when the plants are fully grown, especially the former, and do not allow of earthing up. As the roots cover a wide surface, a large number of shoots are eventually found in the pathways. A better distance to plant would be 5 feet. Usually the pathways between the beds are filled with long-strawed stable manure to prevent evaporation. The beds are given an application of salt occasionally, this being obtained from the fellmongery works close by. This contains a certain amount of blood, which is a good manure, and the application of such salt is considerably cheaper than using the pure article.

The cutting of the grass is done with an asparagus knife, usually home-made, and consists of a saw-edge of a few inches long on the end of a knife-blade. A small bread-saw with the end 2 or 3 inches filed, and given a fine serrated edge, acts admirably.

In this locality the bunches, after having been tied with home-grown New Zealand flax, are made tight by placing a large butt of asparagus cut wedge-shape into the end of the bunch. This is a deceptive practice, and

should be discouraged in favour of tightening with full sticks. The best grass is tied with two bands.

The use of raffia, strips of New Zealand flax, or red tape is recommended, as giving a better appearance than when tied with binder twine.

The cutting period in the metropolitan district extends from August to December, after which the plants are allowed to grow in bush form, in order to replenish their vigour. Allowing the crop to grow in this way is very essential in successful asparagus growing, as it enables a good stand to be maintained each year for a long period.

An Old Asparagus Bed.

As an instance of the lasting qualities of the crop when properly tended, it may be instanced that a small bed of this crop belonging to Mr. Edward Twynam, of Goulburn, is still bearing heavily, although it was an established bed when Mr. Twynam purchased the property in the year 1868. This makes the bed now at least 46 years old.

On the other hand, the Chinese growers at Mascot cut the crop for too long a period, and do not allow sufficient top growth for recuperation, with the result that the beds remain in cultivation for only a few years.

Wood Lice on Seedlings.

A correspondent at Leura has been troubled with wood lice which have been eating off young seedlings.

The Entomologist stated that the best method to kill off the wood lice is to sprinkle Paris green on potato peelings, or similar vegetable matter, and lay this bait among the seedlings. The wood lice can be trapped or got together by leaving bits of board about with a slight cavity underneath, in which the poisoned bait can be placed. Poisoned bran can also be used, as for cut worms, in the proportion of 1 oz. Paris green to 16 oz. bran, well mixed.

Lime and Fertilisers.

A farmer in a coastal district asked the Department how soon after an application of fertiliser he might apply lime to the same land.

The Chief Inspector, in his reply, stated that it is never advisable to apply lime after a fertiliser. The order should be reversed, the lime being applied first and the fertiliser afterwards, at an interval of six to eight weeks.

The reply to the further question, whether wet weather makes any difference, was that it certainly does; the drier the weather the longer should be the interval between the two applications.

Black Spot of the Tomato.

G. P. DARNELL-SMITH, B.Sc., F.I.C., F.C.S., Biologist.

THE "Black Spot" disease of the tomato is very widely spread in New South Wales, and probably no tomato disease causes greater loss.

"Black Spot" usually makes its appearance first at the flower end of the fruit* as a small brown discolouration. The discolouration spreads, and the spot becomes more distinct and definite in outline. At the same time it becomes depressed and darkens in colour. The larger spots, which may be an inch or more across, have a dark-brown or black appearance, and are often somewhat velvety in texture.

Microscopical examination of a spot shows it to be heavily infected with bacteria, and accompanying these there is usually a fungus—a species of *Macrosporium*—which gives to the spot its velvety appearance. These two—the bacteria and the fungus—work together in the destruction of the tomato, and in any case the unsightly appearance of tomatoes affected with Black Spot practically ruins their sale. The sequence of events in the production of a spot would appear to be (1) injury to the skin, (2) entrance of bacteria, (3) infection by the *Macrosporium* fungus. There is some evidence that the fungus, by itself alone, is not capable of producing a typical Black Spot.

Several spots may be found on one tomato. A careful examination of a young spot with the naked eye shows that much of it lies beneath the somewhat fine skin of the tomato, but in older spots the fungus usually spreads over the skin and obliterates it altogether. The fact that the spots lie, for the most part, beneath the skin, explains why it is that spraying for this disease, after it has once made its appearance upon the tomatoes, is not of much avail, for very little of the spray may reach the real cause of the trouble—the bacteria and the fungus. How they get there is somewhat obscure. The skin of the tomato, though thin, offers a very effective protection against moulds and bacteria so long as it is healthy and intact. At the point at which the flowers eventually falls off, the skin is always liable to be slightly weaker than elsewhere, and sometimes it may have minute openings in it. Hence, it is at the flower end that infection is most liable to occur, and it is here that the spot usually makes its first appearance. While most fungus diseases are promoted by a damp, warm atmosphere, and bright sunlight is supposed to be inimical to them, there is no doubt that in some cases too much sun and too little water may so affect the natural resisting power of the skin as to be, in the end, as productive of disease as a damp, warm atmosphere. This is particularly the case with the Black Spot disease of the tomato. It is very largely a drought disease. Where tomato plants

* The question is sometimes raised as to whether the tomato is a fruit or a vegetable. The term "fruit" is used here in its botanical sense, in which case a fruit may be defined as "the later stage of the ovary of a single flower." Under this definition a tomato is a fruit, and so is a cucumber.

are adequately shaded and adequately watered, the trouble is very much reduced. In some experiments conducted by the Department, a crop which had been allowed to become heavily infected with Black Spot under dry conditions, cleared up in a marked manner as soon as it was regularly watered. For preventing the disease, therefore, a regular supply of water is the first desideratum, and adequate shade is the second.

The manner in which this latter is provided must depend upon the nature of the conditions under which the crop is grown. It is possible, and in some cases desirable, to plant the tomatoes so closely together that, when all laterals are left on, they themselves provide a considerable amount of shade. Where this method is adopted, a certain amount of small fruit is likely to be produced, and spraying becomes out of the question. Where tomatoes are staked, and have all the laterals removed, large fruit is produced, and spraying is rendered easier. In the Channel Islands, where a large crop of tomatoes is raised for the early London market, the practice of staking is followed, and in some cases a boy is sent round daily to give each stake a sharp tap with a stick. By this means the tomato plant is shaken, and it is claimed that pollination is in this way promoted, and more fruit set. Certain it is that in ordinary crops a large number of tomato blossoms drop off each season, and no fruit is set in consequence of pollination not having taken place. There are other contributing causes for the premature falling off of the flowers, of course, such as a cold snap, too luxurious growth, or thrips; the writer, however, has tried the above method of promoting pollination in tomatoes under glass, with excellent results. It is possible to spray tomatoes that are staked, and for this purpose lime-sulphur solution or Bordeaux mixture may be used. To prepare lime-sulphur, use 53 lb. lime, 100 lb. sulphur, 50 gallons of water; dilute 1 gallon of this with 50 gallons of water for spraying. Fuller directions for preparing lime-sulphur solution are given in the *Agricultural Gazette* for July, 1914.

To prepare Bordeaux mixture, use 6 lb. copper sulphate, 4 lb. lime, 50 gallons of water.

These sprays will also check the development of Tomato Leaf Spot, due to the fungus *Septoria lycopersici*, but with Black Spot they are not very effective, for the reasons already indicated, that the bacteria are beneath the skin, and the deeper layers of the fungus above the skin are not reached by the spray. Either of the mixtures mentioned may be sprayed upon the crop early as a precautionary measure, but the best means of fighting Black Spot in tomatoes is the provision of an adequate and regular water supply, and sufficient shade to prevent the delicate skin of the fruit from being injured by the sun. Care in harvesting the crop is also essential, for a careful review of the species of fungi that attack fruit shows that very few of them have the power to penetrate a sound skin. It appears that for the most part it is only after some injury has made an opening for them that these fungi can gain an entrance.

Smooth, roundish varieties of tomato do not appear to be so liable to the attack of Black Spot, as the crinkled, irregularly shaped kinds.

Irish Blight on the Clarence River.

Since the widespread occurrence of Irish Blight on the Clarence in 1909, the disease has not been very much in evidence till the present season, when a combination of conditions favourable to its spread led to an outbreak of considerable virulence. In 1909 the Department strongly recommended that all infected haulms and tubers should be destroyed, and that nothing but clean and healthy potatoes should be sent away. Farmers were also urged to plant on new ground, as it was quite evident that the disease was dormant in the Clarence River districts, and might break out with great virulence whenever the climatic conditions were favourable to its propagation.

Wherever these recommendations have been carried out the effects of the disease have been very greatly minimised, and it is largely owing to this that recent years have been so free.

The unusually wet conditions during the present season have interfered with the usual cultural operations, but until a few weeks ago, the bulk of the crops appeared to be healthy. The humid conditions, however, were so favourable to the disease, that the outbreak was almost inevitable.

Extensive spraying experiments have been carried out by the Department at Grafton, Glen Innes, Bathurst, and other Experiment Farms, but the results have been negative, owing to there being no evidence of Irish Blight at those places during the continuance of the tests. In any case, spraying has to be undertaken before any disease appears, and, given weather conditions such as have just been experienced, it would have been very difficult to have saved the crops, even if they had been sprayed early in the season. Continuous rain washes the spray off the leaves, and the ground becomes so boggy that the use of spraying machines is out of the question.

It is very evident, however, that growers have not exercised sufficient care in marketing the crop. In many cases the tubers have been undersized and undeveloped, digging and bagging has been carried on during wet weather, chiefly with a view to catching a particular steamer, undue quantities of soil have been included, and the tubers, after being dug, are bagged and shipped at once. Sufficient shelter is not provided at many of the wharves, and the bagged tubers have lain exposed to rain and sun.

It will thus been seen that even without disease the existing conditions of harvesting the potato crop on the Clarence tend to deterioration before the shipments are finally disposed of, and this deterioration has naturally been accelerated when blighted tubers have been included in the consignment. The inclusion of even a few bags of diseased tubers for the twenty-four hours occupied in transit to Sydney is quite sufficient to lead to disastrous results in a whole shipment.

With a view to preventing the shipment of diseased potatoes and thus avoiding the loss of bags, freight, &c., the Minister of Agriculture has appointed two experienced inspectors to examine the potatoes in the field, and also consignments awaiting shipment. In this way the loss will be considerably reduced, and it is hoped that by a rigid adherence to the recommendations already referred to, the results of the outbreak will be very limited in character.

Precautionary Measures in Later Districts.

In districts where the potatoes may be subjected to Irish Blight but have a much later growing season, spraying with either Bordeaux mixture (6 lb. sulphate of copper, 4 lb. quicklime, and 40 gallons of water), or Burgundy mixture (8 lb. sulphate of copper, 10 lb. washing soda, and 40 gallons of water), may be strongly recommended. The spraying should be carried out before any signs of disease appear, and the first dressing should be applied when the plants are about 6 inches high, and the second when the foliage is well developed. The quantity required is about 100 gallons per acre. Experiments here and elsewhere have shown that when the spraying is well carried out, Irish Blight may be checked or even entirely prevented.

An article on the manufacture of Burgundy mixture and the results from its use in Ireland, was published in the *Agricultural Gazette* for January, 1914, page 48.

Commercial Considerations.

The question which inevitably presents itself is, does spraying pay? In this connection many other questions naturally arise.

Like most fungus diseases, Irish Blight requires a particular set of circumstances for it to manifest itself to its fullest extent, a continued spell of warm "muggy" weather being especially favourable to its development. On the other hand, hot, dry weather may help to check the disease so completely that even on especially infected plots it may disappear, and cases are on record where a healthy crop has been raised one year upon land which the previous year was badly infected.

Even if spraying is carried out, heavy rain may wash the mixture off the foliage, and in many instances, as in the present season on the Clarence, the boggy nature of the ground renders the use of spraying machines impossible.

Spraying is a comparatively cheap insurance against Irish Blight when it can be conveniently carried out, and only the potato grower himself can determine how far it is worth his while to continue the practice year after year, whether the seasons are favourable to blight or not.

Hints on Tobacco-growing.

Transplanting and Cultural Details.

C. J. TREGENNA, Tobacco Expert.

When the plants are from 4 to 6 inches in height and well hardened off, they are ready for setting out. Plants which are stunted and yellow and have long pointed leaves should not be used. The best are those which are most vigorous looking, and with short, broad leaves. If the beds are dry and hard they should receive a good soaking some little time before the plants are drawn, as it is necessary that as little damage as possible to the root system takes place, and the earth adhering to the plants should not be interfered with more than can be helped.

The best way to remove the plants is with a three-pronged fork. If the tap-root is long, it should be trimmed off with a pair of scissors to about 2 inches. The less handling the plants have the better, and after they have been drawn they should be placed, root downwards, in a cool place, and kept covered with wet bags. Only the plants that can be set out on the same day should be drawn at the one time.

It may here be stated that where the aim of the grower is to produce a fine-textured leaf, the plants should be set out close together, and although past experience must be taken as a guide, it will generally be found that a space of 2½ feet in rows 3 feet apart on light sandy loam will not induce heavy growth and coarse texture. This distance of 3 feet between the rows will allow of horse cultivation, and thus lessen labour.

A simple and effective way to mark out the land is to attach four light chains spaced 3 feet apart on a light pole with a handle, so that a man can drag it behind him and walk in accordance with sighting poles fixed for that purpose.

The ideal weather for planting out is just before and during rain, so that the roots of the plants may have very little check, and growth may be established as soon as possible. Unfortunately, however, weather conditions do not always suit the planter, and possibly owing to the lateness of the season, he is forced to set out during dry weather. In this case holes should be made and filled with water, and the plant carefully put in and the earth well packed around the roots. Care should be taken that the roots are not doubled up, and that the hole is properly filled with earth. A simple test is to pull the tips of the two top leaves gently in an upward direction, and if they break off in the fingers they are right. Another method, where irrigation is not carried out, is to make a hole close to the plant and fill with water, and then cover up to prevent evaporation. If the weather continues hot after transplanting, the plants should be shaded with grass. Paper folded in the shape of a tent and held down by two clods of earth is also very effective. It may be necessary to water, and, if so, it is

best done early in the morning or about an hour before sundown. Plants which have struck well usually start growing in about ten days, and the covering may be removed.

If irrigation is carried out, a good plan is to turn two shallow furrows together with a light plough, and run the water so that the ridge gets a good soaking some little time before transplanting. The plants should then be set out on the shady side of the ridge, care being taken that the stem and leaves are high enough above the water to avoid being submerged.

As soon as possible after transplanting it is advisable to run water through again to set the earth well round the bottom of the roots. After five or six days the crust around the young plants should be lightly stirred and broken.

Cultivation.

Tobacco quickly responds to cultivation, and the grower should aim at keeping his land in fine tilth, and free from all weeds up to the time the plants are ripening. During dry weather, by creating a dust mulch, excessive evaporation of moisture is avoided. The root system of the tobacco plant is largely near the surface, and for that reason shallow cultivation must be practised. As soon as a crust is formed, or the ground becomes hard, get to work with the horse cultivator and hoe, and when the plants are high enough, arrange the tines of the cultivator so that the earth is gradually drawn from between the rows towards the crown of the plants. Pronounced ridging will induce the drying-out of the soil, and should be avoided. Neglect of cultivation shows itself very clearly in the value of the tobacco, and no plant is so easily affected. It may be stated generally that the crop should receive a thorough cultivation every week or ten days after the plants have started growing until such time as the horse cultivator cannot be used without damaging the leaves of the plants owing to their size.

Where irrigation is carried out, cultivation must take place as soon as the ground begins to harden or crust. It is useless to water alone if good results are expected.

Priming.

The bottom leaves are almost invariably damaged and dirty. These, generally numbering from four to six, should be removed, and the sap will then be taken up by the remaining leaves, which will be well off the ground.

Topping.

When the flower head or inflorescence has started to develop, the top length of stalk must be broken off. Plants which are strong and vigorous are topped high, and those which do not present these features are topped low. Experience and a fine judgment is necessary to determine the number of leaves that should be left on a plant, but for a normal season twelve to fourteen would seem to be about the number that should be left to mature. Where the entire plant is to be harvested, the planter should aim at obtaining as even ripening as possible to enable him to secure a good uniform cure and quality of product.

Suckering.

Soon after topping has taken place, and sometimes before, suckers will appear at the junction of the leaves and at the bottom of the stalk. As soon as they are about 2 inches long, or large enough to be conveniently grasped, these must be removed. Care must be exercised that in breaking them off the remaining leaves are not torn or damaged. It will be found that early in the morning is the best time to carry out this work, as during the afternoon of a hot day they are tough and leathery. The operation of suckering will most probably have to be repeated each week. Particular attention should be paid to this work, because if suckers are allowed to go far, the quality of the tobacco will be seriously impaired.

Fruit Cases Act, 1912.

Explanatory Notes.

Size of Case for Sale of Fruit.

Where any fruit is sold in a case in New South Wales, or exported in a case from New South Wales to any other place within the Commonwealth, such case shall be of a size, measurement, and capacity as provided in the regulations.

Interpretation of Sell.

The verb sell includes barter and also offers or attempts to sell, or of exposing for sale or of receiving for sale or sending, forwarding, or delivering for sale.

New or Clean Cases.

Where fruit is sold in a case within the State such case shall be either new or shall be clean and free from any of the following diseases:— Codlin moth, Fruit-fly (any species), Scale insects, Metallic Tomato fly, Onion and Cabbage flies.

New Cases must be used for Export.

Where any fruit is exported in a case from New South Wales to any place within the Commonwealth such fruit shall be contained in a case which has not previously been used for any purpose whatsoever.

Cases to show Maker's Name, Address, and Guarantee.

No person shall sell fruit in a case, or export or attempt to export from New South Wales to any place within the Commonwealth fruit in a case, unless and until such case has been legibly and durably impressed, printed, or marked at one end on the outside of such case—

(a) with the name and address of the maker of the case; and
(b) with the words "guaranteed by maker to contain one imperial bushel," or as the size of the case may warrant.

Such name, address, and guarantee to be within a space measuring not less than 3 inches long and 1½ inch wide.

Non-application of Provisions.

These restrictions shall not apply to the sale or export of fruit in a tray, basket, cask, or bucket of any shape or size whatsoever, or to the sale or export of fruit in a crate within which there are trays for such fruit, but every such package shall have the weight or numbers of its contents legibly marked on such package.

Penalty for contravention.

Not more than five pounds for a first offence and not more than fifty pounds for every subsequent offence.

The Construction of Poultry Buildings.

JAMES HADLINGTON, Poultry Expert.

THE difficulties one encounters in laying down hard and fast rules in regard to the housing and yarding of poultry are obvious, therefore any general rule or system will need some modification, and must be varied to suit the different conditions, the environment, and the scale upon which it is intended to run them. But it is clear that some systemisation is necessary in poultry farm construction.

Almost everyone is familiar with the prevailing small yard system of penning both layers and breeders, where the house is situated in the centre of the yard. This system has been slavishly followed everywhere, but has now had its day. Poultry men are looking around for another method to take its place that will economise labour, eliminate the drudgery it entails, and be productive of better general results. It may safely be said that this system, with its small, bare yards, and no provision for scratching exercise, has had a detrimental effect upon the stamina of the flocks, and to some extent upon their productiveness.

Admittedly the small flock system is productive of good results where sufficiently large runs have been given to allow of grass being kept in them, and where to some extent scratching exercises could be indulged in; but the cost of production under these conditions becomes almost prohibitive. It is clear that this system of small flocks, especially those confined to small, bare yards, has not been properly analysed by the average poultry-keeper, or it must have "gone by the board" long ago. With a more thorough knowledge of the subject of running poultry, the only justification that remains for the small yard system is in respect of breeding pens, and these should be provided with scratching compartments.

It is quite understood that one of the incentives for setting the poultry-house in the middle of the yard is to enable the poultry man to erect a lower house than would be necessary if situated on the boundary of the yard. But seeing that in open-fronted houses three sides only are necessary, and the roof is the same in any case, a foot more in height increases the cost but very little, and, in fact, is infinitesimal in comparison with the advantages to be derived from the houses situated on the lanes where the attendant has access to the houses without traversing the yards to get at them.

The Continuous House Principle.

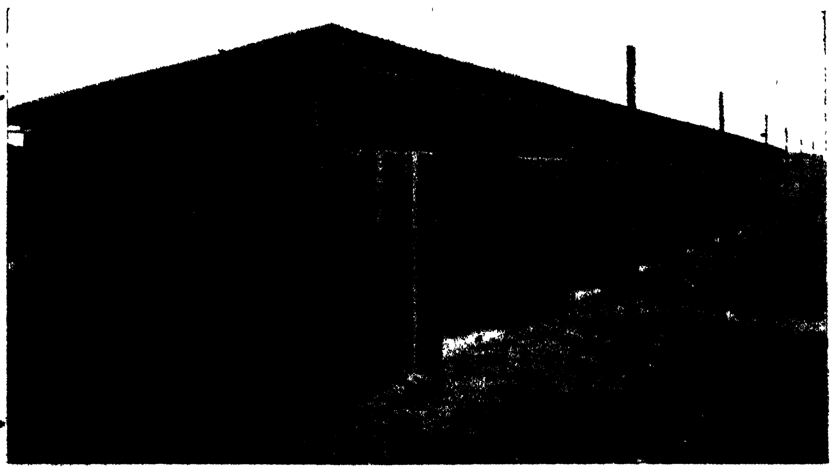
The accompanying illustration shows a section on the continuous house principle in operation on the new poultry plant at the Hawkesbury Agricultural College, Richmond, in which is embodied the scratching-shed principle. This is one of a series of sections designed for breeding pens, but it can also be used for the accommodation of layers.

The size of this section (housing portion) is 90 feet long and 6 feet 3 inches wide (inside measurement), 6 feet high at the front, and 5 feet at

the back, thus forming a long, narrow shed. This is divided into 10-feet compartments, half of which (5 feet) is devoted to the scratching portion, which, on reference to the illustration, will be seen to be closed up at the front to within 12 inches of the roof; the other 5 feet, which is open at the front, forms the roosting section, with two roosts running parallel, the first being situated 15 inches from the back of the house, and the next being 2 feet from it. A low partition, 18 inches high, running from front to back of the house at the intersection of the open and closed space, divides the scratching portion from the roosting quarters; this is for the purpose of confining scratching material to its own compartment, and preventing waste of this material. Doors 2 feet wide by the height of the back of the house are provided at the scratching shed end, opening out on the lanes at the back.

Materials used in Construction.

For bottom plates, 3 x 2 hardwood is used, 3 x 2 Oregon for top plates, studs, and rafters; 3 x 1 hardwood for roosts, and hardwood sawn palings



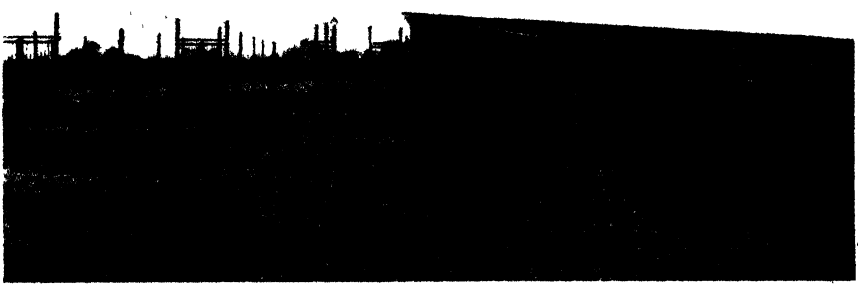
Breeding Pens.
Continuous house principle at Hawkesbury Agricultural College.
Front view.

on the space-and-lap principle for the walls, with a 3 x 1 Oregon batten as a stringer round the walls halfway between top and bottom plates to keep the palings from buckling; 7 feet corrugated galvanized-iron is used for roof, and floors are formed with a smoothly-dressed cement surface of 1½ inches of concrete. The yards are the same width as each house—10 feet, and 40 feet in length. Corner and gate posts are 4 x 3 hardwood, while all other posts, ends, divisions, &c., are 3 x 1 hardwood. These posts are made 8 feet long of 3 x 1 hardwood, with another piece of 3 x 1 hardwood 2 feet long, nailed on to the bottom end, thus making it 3 x 2 for the portion that goes into the ground. These posts should be placed 20 inches in the ground, leaving 6 feet 4 inches out. Posts are placed narrow-edged on to

the wire-netting, not flat to it. This leaves 4 inches of the 3 x 2 bottom portion of the posts showing above the ground. Hardwood battens are then nailed all round the bottom of the yards, to which the wire netting is tacked, instead of placing the wire netting in the ground, thus obtaining the full height of the wire-netting above the level of the ground. The posts stand 8 feet 6 inches apart, and no fencing wire is used round the tops, it being unnecessary when the wire netting is properly erected. The wire netting used is 72 x 2 x 16. Gates are constructed with 2 x ¾ Oregon slatted on crosspieces, which makes a substantial gate.

Alterations in Size for Laying Pens.

As already stated, these sections are erected primarily for breeding pens, and to accommodate from eight to twelve birds. The same principle, however, can be used for layers on the small to medium-small flock idea, and the same size could be made to accommodate up to twenty layers. But where it is desirable to adopt this principle for that purpose, or for flock matings of breeders, the size can be varied to suit any given number up to fifty. In this case the size suggested is to increase the size of the house by 12 inches, using 8-feet iron for the roof; this would allow of three roosts



Another view of continuous Poultry Houses, showing doors and yards.

instead of two. The length can be increased to 18 feet, thus allowing 8 feet for scratching shed, and 10 feet for roosting quarters; this would, of course, regulate the width of the yard to 18 feet, and 60 feet to 70 feet is suggested as the length. These will, of course, be bare yards, as far as grass is concerned, but the idea of the scratching shed is to get over the drawback of restricted range as far as practicable.

The same class of house could be built singly or in pairs on the intersection of yards or runs of much larger dimensions where it may be desired to have grassed runs. To ensure permanent grass runs on fair average quality grass country it is necessary to allow an area of 175 square feet per hen; this is on a basis of giving an acre of ground to 250 fowls.

It is proposed in the next article to deal with the housing and yarding of flocks of 100 and upwards.

(To be continued.)

Monthly Poultry Notes.

JAMES HADLINGTON.

DECEMBER.

THE many inquiries received recently which relate to the present condition of the poultry industry, especially with regard to high cost of feed and somewhat lower returns for poultry products, induces me to set out as clearly as possible the position as seen from a commercial point of view. Feed costs are certainly high, but they have been known to reach a much higher level during drought periods occurring within the last twenty-five years; not only so, but poultry products have been lower. The cause of these abnormal conditions are first, drought, which is local; and the second, the war, which is general, and the effects of the latter will be felt in all countries. In this regard it might be asked, is any business interest likely to escape to some extent the effects of the conditions produced by the war? Therefore, if the immediate prospects of the poultry industry are not as bright as might be wished, it has many companions in a similar or even worse position. But, as pointed out in last month's notes, the idea of over-production as a permanent factor is so much "moonshine," and only exists in the imagination of the pessimist.

At the same time, however, it is just as well to face the fact that the poultry industry, in company with others, appears to be in for a somewhat trying period, and this should lead us to examine closely the principal adverse factors, and endeavour to minimise their effects. The poultry industry is, perhaps, one of the most elastic in regard to meeting temporary abnormal conditions; if feed costs are high, the poultry-keeper can hatch a smaller number of chickens, cull out more severely, and generally eliminate the unprofitable factors in his business. It will at once be seen that such a procedure is not possible in many other industries; drought, storms, &c., as well as fluctuating markets, adversely affect the agriculturist and fruit-grower who has no such means of meeting temporary abnormal conditions, but must maintain his property in an efficient working condition notwithstanding the times of stress; otherwise his property must deteriorate in value.

Cost of Feeding.

The cost of feeding at the present juncture is of the most vital importance to the poultry-keeper. I have already stated in previous notes that the cost of feeding a hen under the normal conditions prevailing during the last few years is approximately 6s. 6d. per year. Last year feed was somewhat cheaper, and the cost of feeding the hens in the Hawkesbury Laying Competition was 5s. 9d. each, whereas it has reached as high as 7s. 6d. in former

years. On referring to the paper I read before the Conference at the Hawkesbury Agricultural College in June last, it will be found that the cost of production to 5½ months old (feed only), on food values then obtaining, was 1s. 2d. each. Taking these figures as a basis to work upon, and they were acknowledged by the Conference to be sound, we can now arrive at the cost of maintenance and production on prevailing food prices.

In the first place, it is necessary to point out that wheat is about 28 per cent. higher; pollard and bran have advanced 26½ per cent.; while maize remains practically at the same value as last year. These figures indicate that the staple foods of poultry, viz., wheat, maize, pollard, and bran, are on the whole roughly 25 per cent. higher; this has to be added to the present cost of maintenance and production, which indicates that the cost of keeping laying hens at present is 7s. 3½d. per annum, and the cost of rearing to 5½ months (feed only) is 1s. 6¾d. on feed values as indicated above. This is making allowance for retail prices as follows:—wheat, 5s. 8d.; maize, 4s. 4d.; pollard and bran, 1s. 6d.; which are in accordance with the ascertained quotations on 14th November. These figures will enable the poultry-keeper to more correctly summarize his own position in regard to the most important items with which he is called to deal.

Having thus indicated the position in regard to normal conditions upon which the poultry-farmer can base his calculations, I desire to point out where a considerable saving may be effected. One of the ways is the substitution of maize, which has been shown to be 1s. 4d. per bushel cheaper than wheat, and which approximates very closely to the same food value as that grain. The popular prejudice against maize as a poultry food is not well founded, and it can be used to a much larger extent than is the case at present. The evening feed can consist of two-thirds of maize, the balance to be wheat, oats, or both; there is no reason why this should not be done, particularly where abundance of green feed is available.

The idea that maize as a food for laying hens is too fattening may be taken as one of the fallacies that have grown up amongst poultry-keepers. The facts are that hens that put on flesh usually represent the poor layers; a good layer is analogous to a good milker, and does not run to flesh. The use of chaffed green feed in the morning mash to the extent of about one-third by weight with bran and pollard, will effect considerable saving in this portion of the ration, and together with green feed given again at mid-day will not only effect a considerable saving in other feed items, but will have a tendency to counteract the possibly more heating properties of the maize.

The best crops to grow for this purpose in their respective seasons are lucerne, barley, Hungarian millet, and rape, and even green maize may be used to some extent in the same way. It might be here emphasised that every poultry farm should have its cultivation area.

These then are ways by which relief may be obtained from the effects of high prices to the extent of from 25 per cent. to 33 per cent. on the cost of feeding as compared with the wheat, pollard, and bran basis.

Elimination of Unprofitable Factors.

Another way in which relief may be obtained is by the process of culling, and a general elimination of unprofitable birds on the farm. These are in strong evidence on almost every poultry run, and if the high feed rates tend to the education of our poultry-keepers in the art of culling out, and the necessity for keeping only the paying sorts, it will not be without a permanent benefit to the poultry industry as a whole.

By this culling is not meant the sacrificing of half-grown cockerels, which, unfortunately, seem to be looked upon as the only kind of culling possible. There is no necessity to do this, except in cases where more rearing has been attempted than there is room for, or ability to feed to the right age for killing. Many are no doubt in this position, but that is their misfortune, and it is in no way due to the unprofitable nature of the business when run on proper lines. Many hens, particularly those approaching their third year, as well as poor layers and weedy sorts, will now be slackening off laying, and in view of the high feed costs it becomes necessary to exercise constant vigilance to pick these out. It is entirely a matter for the judgment and discrimination of the poultry-keeper as to keeping hens that might pay when feed would cost him 6s. per annum as against keeping hens under conditions that cost 7s. 3½d. per annum as at present.

As to whether poultry-farming will pay under present conditions of markets and price of feed, I have no hesitation in asserting that it will, always providing that the poultryman has the necessary definite experience, good sound stock, and applies business principles and methods of economy as already indicated.

BACON CURING.

A CORRESPONDENT recently informed the Department that she had pickled and smoked five pigs according to the directions given in the April issue, and they have turned out a huge success. The bacon has been "pronounced excellent by all who have tasted it, and they have been many."

Agricultural Bureau of New South Wales.

NOTES COMPILED BY H. ROSS, Chief Inspector.

Branch.	Honorary Secretary.
Albury	Mr. J. Brenn, "Silvania," Racecourse Road, Albury.
Baan Baa	Mr. P. Gilbert, Baan Baa.
Balldale	Mr. H. Elrington, Balldale.
Bathurst	Mr. J. McIntyre, Orton Park.
Batlow	Mr. A. C. Arnot, Batlow.
Beckom	Mr. S. Stinson, Beckom.
Borambil	Mr. H. A. D. Crossman, "Homewood," Quirindi.
Bungalong	Mr. G. H. Pereira, "Springdale," Cowra Road, *viâ* Cowra.
Canadian	Mr. C. Smith, Canadian Lead.
Cardiff	Mr. John Cockburn, Cardiff.
Carlingford	Mr. D. K. Otton, Carlingford.
Cattai	Mr. A. J. McDonald, Cattai, Pitt Town.
Collie	Mr. C. J. Rowcliff.
Coonabarabran	Dr. F. G. Failes, Coonabarabran.
Coradgery	Mr. J. Clatworthy, Beechmore, Millpose, Parkes.
Coraki	Mr. G. E. Ardill, Bungawalbyn.
Coreen-Burraja	Mr. N. B. Alston, Coreen, *viâ* Corowa.
Courangra	Mr. S. H. Warland, Courangra, *viâ* Brooklyn.
Cowra	Mr. E. P. Todhunter, Cowra.
Crudine	Mr. F. W. Clarke, Crudine.
Cundletown	Mr. S. A. Levick, Roseneath, Cundletown.
Cundumbul and Eurimbla	Mr. J. D. Berney, Eurimbla, *via* Cumnock.
Deniliquin	Mr. W. J. Adams, jun., Deniliquin.
Derrain	Mr. A. P. Hunter, Red Bank Creek, Matong.
Dubbo	Mr. T. A. Nicholas, Dubbo.
Dunedoo	Mr. C. E. Paine, Dunedoo.
Erudgere	Mr. Frank Hughes, Erudgere.
Fairfield West	Mr. J. H. Spargo, Hamilton Road, Fairfield.
Fernbrook	Mr. W. Marks, Yarrum Creek, Dorrigo.
Forest Creek	Mr. W. Thompson, Forest Creek, Frogmore.
Garra and Pinecliff ...	Mr. A. S. Blackwood, "Netherton," Garra, *viâ* Pinecliff.
Gerringong	Mr. J. Miller, Gerringong.
Grenfell	Mr. G. Cousins, Grenfell.
Gunning	Mr. E. H. Turner, Gunning.
Henty	Mr. H. W. Smith, Henty.
Hillston	Mr. M. Knechtli, Hillston.
Inverell	Mr. W. A. Kook, Rock Mount, Inverell.
Jerrara	Mr. A. O. Lane, Public School, Mullengrove, Wheeo.
Jindabyne	Mr. Sylvester Kennedy, Jindabyne.
Katoomba	Mr. C. Wooller, Oliva Park Farm, Katoomba.
Keepit, Manilla	Mr. J. B. Fitzgerald, Keepit, *viâ* Manilla.
Kellyville	Mr. Joseph Nutter, Kellyville.
Kenthurst	Mr. J. R. Jones, Kenthurst.
Lankey's Creek (Jingellic)	Mr. G. J. Nichols, P.O., Jingellic.
Leech's Gully	Mr. Cecil G. Chick, Tenterfield.
Leeton	Mr. C. Ledwidge, Farm 442, Leeton.
Little Plain	Mr. F. S. Stening, Little Plain, *viâ* Inverell.
Lower Portland	Mr. W. C. Gambrill, Lower Portland.
Mangrove Mountain ...	Mr. G. T. Hunt, Mangrove Mountain, *viâ* Gosford.
Martin's Creek	Mr. P. Laney, Martin's Creek, *viâ* Paterson.
Meadow Flat	Mr. F. J. Brown, "The Poplars," Meadow Flat, *viâ* Rydal.
Middle Dural	Mr. A. E. Best, "Elliceleigh," Middle Dural.
Milbrulong	Mr. O. Ludwig, Milbrulong.
Mittagong	Mr. W. S. Cooke, "Fernmount," P.O., Alpine.
Moruya	Mr. P. Flynn, Moruya.
Narellan	Mr. G J. Richardson, Narellan.
Narrandera	Mr. C. F. Pearce, Narrandera.
Nelson's Plains	Mr. M. Cunningham, Nelson's Plains

Branch.	Honorary Secretary.
New Italy	Mr. F. A. Morandini, New Italy.
Nimbin	Mr. J. T. Hutchinson, Nimbin.
Orangeville	Mr. C. Duck, Orangeville, The Oaks.
Orchard Hills (Penrith) ...	Mr. H. Basedow, Orchard Hills, *viâ* Penrith.
Parkesbourne	Mr. W. H. Weatherstone, Parkesbourne.
Peak Hill	Mr. A. B. Pettigrew, Peak Hill.
Penrose-Kareela	Mr. A. J. Bennett, "Brookvale," Kareela.
Ponto	Mr. A. D. Dunkley, Ponto.
Redbank	Mr. J. J. Cunningham, Redbank, Laggan.
Ringwood	Mr. Wm. Tait, Ringwood.
St. Mary's	Mr. W. Morris, Queen and Victoria Streets, St. Mary's.
Sackville	Mr. Arthur Manning, Sackville.
Sherwood	Mr. J. E. Davis, Sherwood.
Stockinbingal	Mr. J. Neville, Stockinbingal.
St. John's Park	Mr. J. C. Scott, St. John's Park.
Tallawang	Mr. G. Lincoln, junior, Tallawang.
Taralga	Mr. Dave Mullaney, Stonequarry, Taralga.
Tatham	Mr. J. J. Riley, Tatham.
Temora	Mr. J. T. Warren, "Mortlake," Victoria-street, Temora.
Toronto	Mr. J. G. Desreaux, Esmond, Toronto.
Tumbarumba	Mr. R. Livingstone, Tumbarumba.
United Peel River (Woolomin).	Mr. C. E. Burke, Woolomin.
Upper Belmore River ..	Mr. A. W. Fowler, Upper Belmore River, *viâ* Gladstone, Macleay River.
Uralla	Mr. E. A. Neil, Uralla.
Valla	Mr. A. E. T. Reynolds, Valla, *viâ* Bowraville.
Wagga	Mr. Thos. Fraser, Aberfeldie, Wagga.
Walla Walla	Mr. H. Smith, Walla Walla.
Wallendbeen	Mr. W. J. Cartwright, Wallendbeen.
Walli	Mr. Geo. Edgerton, Applewood, Walli.
Wetherill Park	Mr. L. Rainbow, Wetherill Park.
Wollun	Mr. Robert Turner, Wollun.
Wolseley Park	Mr. H. McEachern, Wolseley Park.
Wyan	Mr. C. W. Harper, Myrtle Creek Railway Station.
Wyong	Mr. Edgar J. Johns, Wyong.
Yass	Mr. Cyril Ferris, Yass.

Notice to Honorary Secretaries.

It is important that a record of the meetings of the branches should be inserted in the *Agricultural Gazette*, and honorary secretaries are invited to forward to the Department a short account of the proceedings of each meeting, with a brief summary of any paper which may have been read, and the discussion that followed it, as early as possible after each meeting. Notes for insertion in the *Agricultural Gazette* must reach the Department before the 16th to ensure insertion in the following month's issue.

Insect Pests.—Quite a number of the branches have availed themselves of the Department's offer to supply a set of insects, being the common pests of the district, and the collections are now being cased. The Government Entomologist suggests that as each district has certain pests peculiar to its orchards and gardens, more useful work would be done if the members themselves collected the local pests (orchard, garden, and stock) and sent them to the Department, where they would be arranged, mounted, a descriptive label attached, and returned to the branch. Mr. Froggatt considers that such a collection would have a far greater value, as there would be more interest attached to the specimens when the members knew exactly where the pests came from, and where and how to find them.

Veterinary Lectures.

In connection with the lectures to branches of the Agricultural Bureau, it is herewith pointed out for the information of honorary secretaries that the following is the list of subjects of lectures which can be delivered to them :—

Horses.—(1) Conformation and Unsoundness (with lantern illustrations); (2) Colic and Treatment of Wounds; (3) Strangles, Influenza, and Tetanus.

Cattle.—(1) Tuberculosis (with lantern illustrations); (2) Contagious Abortion and Contagious Mammitis; (3) Ticks, Tick Fever, Tick Infestation and Eradication.

Sheep.—Parasitic Diseases of Sheep.

Pigs.—Diseases of Pigs.

General.—(1) Parturition of Farm Animals (with lantern illustrations); (2) Feeding of Farm Animals and Dietetic Diseases; (3) Sterility: Causes and Treatment in all classes of Stock.

Bee Keeping.

The Department can arrange for demonstrations or lantern lectures on "General Apiary Work and Rearing of Queen Bees." Branches wishing to avail themselves of this offer should make early application.

REPORTS AND NOTICES FROM BRANCHES.

Albury.

Prior to the demonstration by Mr. H. Rogers, Assistant Inspector of Agriculture, a meeting of members was held on 19th October. Mr. F. Wells presided. It was decided that at the annual meeting a presentation be made to the former Hon. Secretary, Mr. J. D. Lankester. There were between sixty and seventy members present, who took a keen interest in the demonstration, which was held on the property of Mr. H. Hoffman, Thurgoona.

The Use of Explosives in Agriculture.

Mr. Rogers first explained the use of gelignite and other explosives, such as cheddite and blasting powder. The Department, up to the present, had always recommended gelignite, chiefly on account of it being the easiest to handle. It was particularly useful to beginners, but after, when they had more confidence, he would advise trying other explosives, until the most economical for local conditions was found. The action of each explosive was fully explained, so as to help those who intended taking up the work. The various appliances used, such as detonators, both electric and ordinary, galvanometer, exploder, &c., were dealt with in detail, and instructions given for avoiding misfires through short circuits, and accidents through carelessness.

Some difficulty was experienced in selecting a tree, as practically all the trees were hollow. Eventually a hollow tree, 20 inches in diameter, was fired, at a cost of about 1s. 1d. While all the roots were not removed, it was brought to the ground in a broken condition, and the remaining roots left so that they would pull out easily by hand.

A fairly sound stump, 2 feet 6 inches in diameter, was next operated on, and was removed at a cost of 1s. 3d.

Mr. Rogers here explained that any stump or tree could be removed, roots and all, but owing to the cost it was necessary for the operator to use his discretion, and only place sufficient explosive under the object to carry out the work required. Anything spectacular should be avoided.

A demonstration was also given in shattering a stump, 3 feet diameter, for burning purposes. A little too much explosive was used, but the object was achieved at a cost of 6d., at which all present expressed satisfaction.

Subsoiling was also dealt with. A charge was put down and fired by means of a No. 6 detonator attached to a safety fuse, and the effect upon the soil was observed with interest. Many questions were asked, and full explanations given. A vote of thanks was moved by Mr. Wells, and carried by acclamation.

Borambil.

A lecture was given by Mr. A. E. Massy, M.R.C.V.S., before this branch on the 27th October, the subjects dealt with being contagious abortion and mammitis. The attendance was good, some members having travelled considerable distances to be present.

Canadian.

A meeting of this branch was held on the 10th October, when it was decided to hold the annual meeting after harvesting operations are completed.

Carlingford.

At the last meeting of this branch a lecture was delivered by Mr. Henry Lord, G.T.C.A.C., of the Technical College, Sydney, on the "Agricultural Problems of the Poultry-farmer and Vegetable Grower."

Mr. Lord explained the principles of underground draining and liming, and illustrated his remarks by means of practical experiments.

He pointed out that not only was underground draining essential in order to secure the best results from cultivation, but also that it was highly desirable that the ground on which poultry were to be kept should be so treated.

Mr. Lord also touched on the question of breeding and the feeding of poultry, and answered many questions put to him.

Collie.

This branch held its regular monthly meeting on 31st October. The Secretary exhibited fine specimens of Canberra and Thew wheat which had been sown on 7th July last. The quality of these called forth some little comment, more especially the Canberra sample. The rainfall for the growing period was only a little over 1 inch.

Coradgery.

The annual meeting was held at the residence of Mr. H. N. Marriott, Hubberstone.

The annual report stated that the branch was formed on 20th August, 1913, and now had a membership of fifty-eight. The meetings have proved of educational value, farming in all its branches being freely and intelligently discussed. Papers had been read on the eradication of black oats, fallowing, harrowing of growing crops, and treatment of farm horses. The seed wheat competition had evidently been appreciated by members, as indicated by the number of entries, viz., twenty. The results were anticipated with interest, for all particulars, such as variety of seed, mode of cultivation, rainfall, &c., were being recorded; useful information will thus become available. Permission has been obtained to enter, as a non-competitive exhibit at the next Parkes Show, 1 bushel each of the twenty different wheats grown. The Department of Agriculture had sent experts to lecture and give demonstrations on the following subjects, viz.: Fruit tree pruning and planting, veterinary, and sheep and wool. Experiment wheat and fodder plots had also been arranged for.

The following officers were then elected:—President, Mr. W. E. Taylor (Adavale); Vice-Presidents, Mr. J. L. Whitmill (Wombin) and Mr. G. C. Harris (Wallandra); Secretary, Mr. J. Clatworthy (Beechmore); Treasurer, Mr. H. N. Marriott (Hubberstone).

HOW TO INCREASE THE CARRYING CAPACITY OF WHEAT-GROWING LAND.

Mr. W. R. Birks, B.Sc., Inspector of Agriculture, delivered an address on the above subject, handling it so as to show the part played by fodder crops in enabling the small holder to stock up more heavily without undue risk. The system of farming suggested for wheat growing and fat lamb raising is to have the total area divided up each year in the following way:—One-third stubble ground, one-third fallow, one-third wheat. Under such a system it should be the object to carry as many sheep as the land was capable of carrying under station conditions, and probably more. In a case under similar conditions to Parkes, carrying more than a sheep to the acre for the whole area of the farm, at least one-quarter of the holding was under wheat each season. It is very necessary to fallow for wheat under such a system to ensure a payable crop, as, compared with sheep grazing, wheat growing on stubble ground in an ordinary run of years is an unprofitable occupation. Of two farms adjoining in Gilgandra district, where one had 300 acres of fallow crop and gave a return of ten bags per acre, the other had 1,000 acres on stubble ground returning three bags per acre, showing little or no profit over working expenses. In the latter case none of the land was available for grazing, and the farmer would have been better off if he had left wheat growing alone and used the ground for grazing.

The period of the year when fodder crops are likely to be most useful is from February to August. To provide for a pinch which may occur in the latter half of this period autumn-sown crops are advocated, and summer crops for the period February to April. Taking these two sets of crops separately, and dealing with the autumn sown first, there are a very large number recommended, including the following:—Rape, barley (Skinless or Cape), field peas, kale, oats, rye, mustard, &c. Of these, the two first mentioned stand out conspicuously. In the cultivation of these the ground is broken up as early in the new year as possible to a depth of 3 inches with the disc cultivators. A further cultivating or harrowing after rain should bring the ground into good condition for seeding operations, which should be carried out as early in February as possible. The seeding may be done with the ordinary grain drill in the following manner:—The barley is allowed to run out of every third cup in the seed box at the rate of 12 lb. per acre; the rape seed is mixed with the manure at the rate of 3 lb. to the ½ cwt., and the drill set to sow ½ cwt. of the mixture; in this way, the rape is sown in every drill. The barley, however, will choke it out in each third drill, but this loss of rape seed is negligible. Care must be taken not to allow the rape seed to stand mixed with the superphosphate for more than two hours, as the germinating capacity will be completely destroyed if this precaution is neglected. The best method is to have a tub in the paddock in which the seed and manure can be mixed as required. It is necessary to set the drill to sow very lightly, one-half to an inch being the desired depth; anything deeper than this will probably prove detrimental to the germination and subsequent growth of the rape. Given good conditions, this crop should be available for first feeding off in from six to eight weeks. The disposal of the crop will then depend on individual conditions, but the ideal to be aimed at is as follows:—The area should be divided, if possible, by temporary fence, and the stock (sheep or cattle) given the run of one portion at a time in conjunction with a grass or stubble paddock. When the first portion of the crop has been eaten down this may be spelled and stock turned into the other; under normal conditions there should be a good second growth, and by the time the second is fed down, the first portion should be ready for feeding off again, and this process can be continued throughout the winter. It will be noticed that the crop will be available throughout the lambing season, and it cannot be more profitably used than by grazing ewes, as the unparalleled value of rape for milk production is reflected in the growth and fatness of the lamb, and this even applies to aged ewes. It is difficult to arrive at the actual value of the crop, but figures from cases in this and similar districts may be quoted. The local autumn fodder experiment plots on Mr. W. Moss's property had already carried stock equivalent to twenty sheep to the acre for six weeks, and this in spite of the fact that the unprecedented dry conditions of the last two months had not allowed of a second growth; nevertheless, the stumps of the plants were still alive, and with rain would respond immediately. Under normal conditions probably double the amount of grazing

would have been obtained. In other districts results to date have been twenty sheep to the acre for eight weeks, six weeks, and three weeks. In the last case the crop had an exceptionally bad time, and was adjudged a failure. Thus, supposing, on a thousand-acre farm, 50 acres of autumn crop were planted, provision would be made for half the flock for the greater part of the winter.

Summer fodder crops are meant to supplement the grazing land in late summer and early autumn. Crops available for this purpose are various kinds of sorghums, cowpeas, maizes, and millets. Here, again, two varieties stand out from all others, viz., Early Amber Cane Sorghum and Black Cowpeas. For the cultivation of these we take a portion of the fallow prepared for next year's wheat crop, which in the ordinary course would be in good condition for seeding in spring time, and will require little or no extra cultivation. Twenty to 30 acres is a fair area to try in the first place. Seeding should be carried out as early as possible after danger of frosts is over, in this district say mid-September. The sorghum and cowpeas, like rape and barley, are best planted in a mixture, but must be planted in rows about 3 feet apart to allow of summer cultivation, which is not only necessary to ensure the growth during the summer, but also keeps the ground in good condition for the prospective wheat crop.

The method I recommend of sowing is with the ordinary grain drill again, as follows, viz.:—Mix at the rate of 3 lb. cowpeas with 6 lb. of sorghum to the acre. This mixture should be run out of every fifth tube of the drill, others being stuffed up with bagging; the setting of the drill to sow the required quantity can only be arrived at by trial. The seed should be sown from 2 to 3 inches deep, and, as with all other crops, a light dressing of superphosphate, say 30 to 40 lb., will be found a beneficial and payable investment. This crop should be harrowed as soon as it is 3 to 4 inches above ground, and then after cultivated between the rows after heavy rains. This can be done with the ordinary spring-tooth cultivator by removing the teeth that would otherwise root up the young plants.

The disposal of this crop also depends on the individual conditions. There is danger of poisoning by sorghum if fed while young or stunted, but if ordinary precautions are taken not to allow the stock to gorge themselves, and a larger paddock of grass is available for grazing at the same time, the crop may be disposed of in this way with little or no risk. The value of the crops used in this way during January, February, March, and April is approximately equal to autumn rape and barley in normal seasons. With a wet summer growth is often remarkable, and in this event the most profitable manner for the disposal of the crop is to cut it with the ordinary binder and make into ensilage, either in pit or stack. A good example of the value of summer crops can be quoted from a case at Gilgandra last year. Sorghum, cowpeas, and maize were planted last November on fallowed ground, and came up with rain. Little or no rain fell during December and January, and growth was consequently poor. At the end of January the crop was abandoned and stock turned in and allowed to eat it bare. Good rains fell in February, and again in March. The sorghum and cowpeas made a wonderful recovery; the former stood about 7 feet high in April, and was eventually cut and stacked for ensilage, the estimated yield being 10 tons to the acre. The same, if not better, can be achieved in this district, as evidenced by the results obtained by Mr. Hiram Nash some years ago.

As to the financial outlay involved, it has already been pointed out that the summer crop is put on to land fallowed for next season's wheat crop, and no extra preparatory cultivation is required. The total outlay, therefore, only amounts to the cost of seed and the drilling, plus whatever manure it is thought necessary to use. The subsequent cultivation between the rows corresponds with that which the fallow receives in the ordinary course.

In the case of the autumn crop, the extra cultivation amounts to one or two workings in the summer, and it must be borne in mind that the effect of this cultivation is not lost on the next wheat crop, as it improves the condition of the fallow; in fact, the practice of discing is already adopted by many prominent wheat farmers on a large scale.

Supposing this practice is adopted, the outlay is the same as for summer cultivation, but plus the cost of seed, manure, and one drilling, roughly, 5s. per acre. In the event of the crop being a total failure there is very little

to lose, and the land is in good condition for the ensuing crop of wheat. On the other hand, given ordinary good conditions, one stands to make a very good return, and the land is still available for wheat.

In the case of autumn crops the land is fallowed at the end of winter and worked through the summer for wheat next year, and after the removal of the summer crop a cultivation makes it ready for wheat. For the improvement of the land to be used for grazing only, I would recommend sowing lucerne, and for increasing the grazing value of stubble land I would strongly recommend the sowing of 5 or 6 lb. of lucerne seed along with any cereal crop intended for hay. This is easily done by mixing with the manure in the same way as rape. The small outlay represented in the cost of seed would, under ordinary conditions, give a very payable return in extra grazing, and might in a wet summer be the means of establishing quite a good stand of lucerne.

Coreen and Burraja.

A demonstration of subsoiling with explosives was given by Mr. H. Rogers, Assistant Inspector of Agriculture, at Mr. D. W. Swan's farm, Coreen, on 22nd October. There were about thirty farmers present, and it was generally acknowledged that explosives would prove a cheap and effective method of subsoiling. Keen interest was displayed by those present.

Cundumbul and Eurimbla.

A new branch has been formed here, with twenty-three members to commence.

The annual subscription has been fixed at 2s. 6d., and the following office-bearers have been elected:—Chairman, Mr. F. H. Bisley; Vice-Chairman, Mr. F. Meurant, junior; Hon. Secretary and Treasurer, Mr. J. D. Berney.

Dunedoo.

At the recent meeting of this branch new office-bearers were elected, as follows:—Chairman, Mr. H. A. Patrick; Vice-Chairmen, Messrs. L. Yeo, A. Sheridan, Jas. Yeo, G. W. New, E. Hammond, and D. K. McLeod; Treasurer, Mr. A. E. Garling; Hon. Secretary, Mr. C. E. Paine.

Fairfield.

The monthly meeting was held on 8th October.

Messrs. Stimson and Napper spoke interestingly of a visit made by them to a poultry farm at Carlingford, where the intensive system is in operation. The owners of the farm have been in the business for eighteen months, and had made a success of it. The ease and comfort with which large numbers of hens and young chickens were cared for, compared with the old system, appealed to the visitors. A general discussion, at the close of Messrs. Napper and Stimson's remarks, took place on the intensive system as compared with ordinary housing and yarding. Some members appeared inclined to give the system a trial, although many thought that the methods at present in use here, viz., open runs with open-fronted houses, would always prove the most satisfactory in this climate.

Members visited Hawkesbury Agricultural College on 14th October. The visit proved interesting and instructive, and members felt grateful to the Department for the arrangements made, and to the officials at the College.

Messrs. Spargo (Hon. Secretary) and H. Godfrey (Assistant Hon. Secretary) have attended the last two meetings of the St. John's Park branch, where they were heartily welcomed on each occasion. It is hoped that the members of that branch will be able to reciprocate.

Inverell.

At the monthly meeting of this branch it was decided to ask the Department to supply suitable seed for fodder crops for dairy cattle in the Inverell district.

Mr. G. F. Lewin read a paper, in which, as he said, he gave a few facts about the fruit fly as it affected orchardists locally, and the best means of fighting it.

The Fruit Fly.

The Queensland Fly (*Dacus tryoni*) increases and spreads in a manner similar to the common brown fly, and is just as susceptible to changes in temperature. I have known the fruit fly practically killed out for the year by a cold snap in the spring, and by a heat wave in January. It is a point for discussion when the fly first makes its appearance in this district. Some years I have known it to attack loquats early in November, other years it has not put in an appearance until February. Extra cold in winter does not in any way affect the fly, but excessive rain from May to September destroys immense numbers, especially if the ground is of a muddy nature, and sets hard after the rain.

A few years ago there was a great agitation amongst orange-growers over the ladybird that feeds on the red and black scale of the orange, and I believe on other scales and insects also. After all the expense, time, and trouble taken to introduce and distribute the ladybird, all orange growers that want clean, marketable fruit, now put the tent over the tree and kill the ladybird together with the scale by hydrocyanic gas.

The lazy orchardist depends on theories that often fail when put into practice, and in the meantime he supplies his neighbours with all the diseases that abound in his particular neighbourhood. It is common knowledge that the last brood of maggots in the autumn work down into the soil and hibernate there until the following spring. As mentioned before, the elements occasionally destroy a large number of the maggots when in the soil, but sufficient always survive to keep the species going. The first brood in spring is generally a comparatively small one, each successive brood becoming more numerous, excepting in the event of a heat wave or an excessive cold snap.

Small flat vessels of kerosene placed on the sunny side of the tree will account for a few flies, but the only reliable method is the destruction of the affected fruit. There are various methods of destroying the fruit, *i.e.*, burning, burying, drowning, &c. I strongly object to burning, on account of the labour and expense it incurs. Fruit being mainly composed of water requires a large amount of fuel to destroy it, and in many districts fuel is scarce and dear. Burying is also an expensive job, and unless the fruit is buried fairly deeply there is a chance of the maggot working back to the surface. Drowning entails a fair amount of work, but is preferable to either burning or burying, as the destruction of the maggot is certain. Six or eight hours under water will account for every maggot. I advise farmers to kill the fly in the embryo state. Last year I drowned the fly, and then fed the fruit to the cattle. This did not interfere with the milk supply; it really increased the supply, which was perfectly pure. The Fruit Inspectors should have more power to prosecute. Burning is no good. There would be little trouble but for those who will not keep their orchards clean.

It was agreed to ask the Government to take stringent action regarding the Queensland fly, peach aphis, red scale, San José scale, and other pests, and to increase the powers of inspectors.

Lower Portland.

The regular monthly meeting of this branch was held on 12th October, and was very successful, a large number of members being present.

The following paper was read by Mr. J. J. Herps:—

Bean Culture.

The first thing to take into consideration in bean culture is the preparation of the soil, which needs to be thoroughly ploughed twice, and harrowed; if the season is inclined to be dry, and the land cloddy, the roller may be used to advantage before planting. There are many varieties of beans credited with being profitable varieties to grow, but the Canadian Wonder is generally admitted to be the most prolific, and best suited for market gardening. The butter bean is also a good variety for household purposes.

The soils best suited for growing beans differ considerably with the conditions and the time of sowing. For instance, if an early spring crop is required, a rich loam is found very suitable, as this class of soil is generally sweeter in the spring than the low-lying lands in the swamps. But if a summer crop is required, then the lower lands are found to produce very prolific crops.

Beans should be planted in rows 3 feet apart, and from 2 to 3 inches space between the plants, and covered to a depth of 2 inches. Cowyard manure, or bonedust, sown along the drills, is found to produce very good crops of beans.

Cultivation.—When the plants are a few inches high they should be worked through with the hoe, and should the beans show a pale-green colour, a furrow should be taken away with the plough, and left open for a couple of days, if the weather will permit. This allows the ground to sweeten. The garden harrow should then be put through as often as possible, until the plants are tall enough to be hilled with the plough, and the middle should be cleaned out with the plough. Then if the weather is dry, or a heavy downpour of rain comes, the garden harrow can again be used to advantage, breaking the crust, and also checking any weeds that might spring up after rain.

Beans may be planted any time after the frosts are gone, say from September up to March, and sometimes even until April, if the winter holds off well. The end of November or beginning of December, if the season is dry, and there is any low land procurable, is a good time to plant, and will produce very profitable crops, especially if irrigation is practicable. February also is sometimes a good time to plant, but of late years the November-December crops, and the real late ones, have been the most profitable, on account of the dry weather in the case of the first, and the risk of frost attached to the latter, which prevent many growers from planting at these times. Taken on the whole, however, beds of beans planted in rotation all through the season would be the better way to fill in the bill, as a good crop of beans, though the prices may not be high, will (on account of their productiveness) always pay for the amount of labour expended on them, and when, as they sometimes do, they realise up to 6s. and 7s. per bushel, they pay handsomely.

Discussion.—An interesting discusssion followed the reading of the paper, Mr. C. Lowe said he thought that 2 to 3 inches apart for the plants was too close, also that the drills might be made less than 3 feet apart.

On being questioned, Mr. R. J. Mitchell (an experienced grower) said that he found the best distance to plant beans was to have the drills 3 feet apart, and to drop the seeds from 8 to 9 inches apart. This allowed the plants to grow into sturdy vines, which were not so easily knocked down, and would give the vines a longer life; they would also continue to bloom right down to the butts, thus giving a far greater yield than if the vines were crowded together. By planting in this way, Mr. Mitchell said that last season he had pulled 500 bushels of beans off 1 acre. As regards manuring, he recommended bonedust in preference to the special artificial manures. Bonedust was a little slower to act, but generally it acted when the vines were cropping, and that was when they needed assistance.

Many other points of interest were discussed, and it was generally admitted that on the lighter soils beans may be grown a little closer than on the stronger land.

A hearty vote of thanks was accorded Mr. Herps for the paper. In reply, Mr. Herps said he was convinced that he had been using too much seed, and would this year adopt Mr. Mitchell's plan, and use only ½ bushel of seed to the acre.

Martin's Creek.

The monthly meeting of this branch was held on 5th November, when one new member joined.

With a view of encouraging young members to take a keen interest in the working of the branch, it has been decided that one of the younger members shall act as chairman at each meeting.

Meadow Flat.

A meeting of this branch was held on 6th November. The meeting was addressed by Mr. W. R. Birks, B.Sc., Inspector of Agriculture.

Ensilage Making.

Ensilage is the name applied to fodder that is kept preserved in practically a green state. The lecturer pointed out that the only cause for anything going bad was the presence of putrefactive organisms. If these could be eliminated or controlled, we could keep stuff for any length of time.

If milk was boiled so that the putrefactive organisms were killed, and was then bottled and corked up and kept air-tight, it would keep fresh for years.

If grass or any greenstuff were heaped up, and the various changes taking place watched, it would be noticed that just before it turned rotten (with a characteristic offensive odour) it turned a nice yellowish brown colour, with a pleasant odour. This was the correct time to kill the putrefactive organisms.

These organisms were killed by the heat caused by fermentation, and the best way to obtain that end was to stack the material in big stacks, and to stack it as tightly as possible. The heat caused by the fermentation killed the putrefactive germs, and so long as the main block was kept air-tight the ensilage would keep indefinitely.

The lecturer showed various lantern slides of various types of ensilage stacks and silos. Stacks were shown to be the most wasteful of all forms of ensilage-making, as the edges were no good. The best way was the tub silo, which was filled with chaffed greenstuff, in which there was no waste.

The best crops from which to make ensilage were maize, sorghums, and others of the same class. Oats, wheat, peas, and, in fact, almost anything, including weeds, could be made into ensilage.

The best time to cut maize for ensilage was when the leaves were just drying on the bottom part of the stalk, but just before the grain hardened.

The lecturer then showed a good collection of slides, illustrating various methods of silage-making, corn and various other cereals growing, and also the best machinery for cultivating the ground, as well as various slides showing the contrast between manured and unmanured wheat.

A vote of thanks was accorded Mr. Birks on the motion of Messrs. C. Scott and Eslick. Mr. Birks, in reply, said that he was sorry that he could not get round and meet some of the farmers on their own places, but next time he visited the district he hoped to see the countryside dotted with silos.

Mr. T. L. Williams occupied the chair.

Middle Dural.

The President, Mr. C. Roughley, read the following paper at the October meeting:—

The Cultivation of Orchard Land.

In districts devoted wholly or almost wholly to fruit-growing, the cultivation of the soil is regarded as an absolute necessity, while on the rich river flats,

or in soil particularly good, it is, to say the least, an advantage. During the last few years the methods of cultivation in this State have undergone great changes, and made great progress, to the comfort and benefit of the orchardist. We have been slow to emulate the example of our American brethren in the matters of soil cultivation and fruit culture, but now, having their methods fairly well established, it seems only a matter of time when we will be abreast of them. In soil cultivation we have borrowed the idea of ploughs, harrows, and spring-tooth cultivators, while in the matter of handling fruit, drying, and marketing your Yanco settlers will, I think, in a few years equal our oversea neighbours.

The question of the cultivation of orchard land may be divided into three sections, or rather, the land may be divided into three classes: First, the deep, friable, black soil; second, the stiff, shallow, retentive, clayey loam; third, the sandy loam. Our district is composed mainly of soils designated under the first and third headings.

This question of soil cultivation naturally involves other branches of our occupation; it is at once bound up in other questions; for instance, it is hard to talk about soil cultivation without mentioning fertilising, green manuring, mulching, or liming; but I will adhere to my point as faithfully as possible. A deep, friable black loam requires less cultivation than any other soil. By too frequently working it in dry weather, it becomes powdery, deep, and dusty, and when rain comes it will run together, and (if not cultivated quickly after being moistened) will soon become natureless, cloddy, and dry. A light, careful ploughing will often serve the purpose of cultivation better than any other means, as, for instance, when the ground is fairly damp in early spring, when it has been tramped by the fruit-pickers and those picking up the windfalls, or in autumn, when there is a moderate coat of weeds. Then it has the effect of retaining the moisture and pulverising the ground more effectively than any other means. This class of land should never by any means be allowed to forego a good winter ploughing. Care should always be taken to have the ground worked to a fine tilth in the warm weather. Conservation of moisture is our only hope of keeping trees in a decent state during the summer months. If a fruitgrower believes in and commences using a harrow, cultivator, or other similar implement, he must use it systematically, or substitute a ploughing; that is to say, he must harrow constantly, or plough instead, as, if he harrows his land and lets it remain unstirred for any length of time after rain, he will be undoing all the good he has previously done, and at the same time doing untold damage to land and trees. Care should be taken not to work the ground too soon after rain, as by so doing it will very quickly run together and become hard and dry. In surface cultivation discretion must be used as to what implement to use, and also as to the time to do it. Generally speaking, a machine of the spring-tooth type is the most suitable; it mixes the ground nicely, besides lifting the bottom soil, because in black soil the finest and best of the ground works to the bottom.

The second class of land is probably the hardest to deal with successfully, because of its retentive and less productive nature. The question of its cultivation is, to my mind, inseparably linked with the liming of land, green manuring, and similar treatment. But to deal with the cultivation without the assistance of these things care must be exercised not to work the land when it is too wet. No land will go so "bricky" as a stiff, clayey loam. Still, immediately the ground can with safety be worked, it should be done. It should be ploughed fairly deeply, and cultivated, that is, harrowed, very lightly. A shallow ploughing will in most instances be ineffective, because, owing to its hard nature, the plough will not work the ground evenly, whereas by ploughing a fair depth, the plough will grip and work on an even, level bottom. It should be harrowed lightly to make the surface very fine. The subsoil is better left undisturbed, for the rain will complete the job. One should never wait for weeds to grow here before working. Very probably the crop of weeds, if left, will be a sparse one, and by neglecting to harrow constantly, the land will be rendered highly unproductive. Only constant light cultivation will render it profitable to utilise. In hot, windy weather, a ground roller should be requisitioned; exposure of the subsoil will quickly result in dry, lumpy ground. In ploughing, always use a plough that throws a compara-

tively narrow furrow, and pack the ground nicely; it will facilitate harrowing, and tend to conserve moisture. A harrow of the duck-foot or diamond type is the most suitable, as they leave the land very level. Of course, this land requires special feeding. Always stir the surface immediately after a hot, drying wind, and after every shower, if possible.

A free working, sandy loam requires plenty of cultivation; no land can do with more; but the results are indeed pleasing, the returns being proportionately greater. A plough need only be brought into use on the following occasions:—When the ground has become hard; when, through a long period of wet weather a heavy coating of weeds has resulted; and when one wishes to work deeply in winter. The main thing to observe in cultivating a sandy loam is to keep the land constantly and thoroughly stirred; whether a very light or moderately deep working depends on the depth of the soil. In no case disturb the fibrous rooting of the trees. The essence of cultivation in all lands is the conservation of moisture. A plough of the Yankee type is the most suitable, for it leaves the land nice and level, besides pulverizing it. The implement to be used for summer working depends solely on the choice of the individual; all are good, but whatever is adopted, give it no rest; the results will pay. This land will not go hard like the last-named under certain conditions, as windy weather for instance, but neglect of cultivation will result in loss of moisture. If, owing to untoward circumstances, such as drying winds following on a lot of rain, the land becomes very hard, it should not be ploughed in dry weather. The ground would then be left exposed to the weather, and often becomes very lumpy, and the fibres of the trees are interfered with. It is far preferable to use a harrow or cultivator. The ground may not be worked to the satisfaction of the grower, but it will be the better plan to adopt. It will be noticed that only horse implements are dealt with, for the old methods are, owing to labour conditions, quite obsolete.

Nelson's Plains.

Mr. Wigan, Dairy Instructor, delivered an interesting lecture on dairying to members of this branch on 13th August. He dealt with the advance of dairying, showing that cleanliness was the great essential to first-grade butter, and that that cleanliness should be in connection with the cow bails, the utensils, and everything else used in the handling of milk and cream. A scientific explanation of the injurious effects of certain germs on milk and cream was given, and it was shown that these germs were the product of unclean and careless methods. Several practical hints were offered about how to secure good results with very little more trouble than with the old careless methods. On the commercial side it was shown that, owing to the increased manufacture of margarine displacing second-grade butter, it paid the farmer to produce cream that would make first-grade butter.

Nimbin.

The above branch held its usual monthly meeting on 31st October. A discussion took place on "Artichokes *v.* Sweet Potatoes." Usually good crops are obtained from planting the former 4 feet to 5 feet apart, but few farmers in the district have tried them. It was generally agreed that, for the Richmond River, sweet potatoes were best for pigs, and that farmers preferred them to artichokes.

Ponto.

The annual meeting of this branch was held on 6th October, when the following officers were elected for the ensuing year:—Chairman, Mr. L. A. Stuart; Vice-Chairmen, Messrs. E. A. Stuart and W. White, senior; Hon. Secretary and Treasurer, Mr. A. D. Dunkley.

The Secretary reported that eight meetings had been held during the year, and several lectures delivered by departmental officers. The branch had a credit balance of £1 4s. 10d. at the close of the year.

The following paper was read by Mr. R. A. Stevenson:—

Durham Cattle.

In a district such as ours, where the population is insufficient for dairying, or the railway too far away, the most profitable cattle to breed are Durhams. They are certainly not such good milkers as many other breeds, but where the area is sufficient to keep a few cows they are very profitable as beef cattle. They are much sought after by butchers, as they weigh more in proportion to size than others.

The first and main object is to procure a good sire. The intending purchaser should go to some well-known cattle-breeder. From him he may not get a prize-taker, but he can probably get one as well bred, and breeding is one of the principal items.

A Durham sire should be thick and low set, with short horns of even size and shape; short thick neck, straight from the shoulders to the butt of the tail; broad shoulders and hips, and fairly long body. Have a heavy-quartered bull; to ensure heavy forequarters he must have a deep brisket and big girth, and for heavy hindquarters he must be deep flanked, big in the thigh, and fairly long from hip to butt of the tail.

The same points apply to the cow. One of the best characteristics of the Durham is the beautiful colour, and soft silky coat. The best and main colours are roan, red, and white. In purchasing a sire, get either a dark roan or a blood-red If the cows are light roans or white, have a blood-red sire, and as a rule dark roans or reds will be dropped. Do not have anything to do with a bull which has a black nose, hard bright-looking coat, or tight skin.

The best age to commence breeding from heifers is shortly after they are 2 years old, as then they have aged sufficiently when they have their first calves The most suitable time to have cows calving in this district is the latter part of autumn; then, as a rule, there is plenty of feed for both cows and calves. If the cows are calving, say, in April, the calves can be weaned not later than December or January, and that will give the cows a chance to put on condition before they have their next calf. Never keep one of your own stock as a sire, and never cross a sire with his own heifers. If it is possible, break the cows into a bail, so that they can be milked a few times while the calf is young.

Redbank.

A demonstration of castration was given by Mr. A. E. Massy, M.R.C.V.S., in the afternoon of 3rd November, at Baggan. One colt was castrated by Mr. Massy, after which a farmer present volunteered and performed the operation quickly and well on two animals. In the evening a lecture was given on conformation and unsoundness of the horse.

Sackville.

The annual meeting of this branch took place on 2nd October, when the following office-bearers were elected for the ensuing year:—Chairman, Mr. C. Kaiser; Vice-Chairman, Mr. R. Holmes; Hon. Secretary and Treasurer, Mr. A. Manning.

The Secretary reports that eleven meetings were held during the year, at which papers prepared by members were read and discussed. Members took a keen interest in the discussions.

The following is a resumé of a paper read by Mr. T. Books at the October meeting:—

CARE OF THE HORSE.

To the man on the land the care of his stock is of great importance. The horse is specially worthy of good treatment, its lifetime and usefulness depending a good deal on the care and treatment it receives from youth upwards. The time when it is being broken in or reduced to obedience is a most important one in the education of the horse. Gentleness, yet firmness, ought to be a prevailing principle of management. He should be educated so that in the future he must act the part of a dutiful servant to an indulgent but firm master. If the owner has not had the experience in breaking in young horses, they are best given out to some experienced person, so that they may be broken in thoroughly, and can be relied on afterwards to be good servants It is not good policy to overload horses when young, or in fact at any time. Many a good animal has been spoilt in this way. Always remember there is a limit to an animal's strength, as well as human beings. On no account allow the harness to hurt in any way, and do not forget that proper management in feeding is a matter not to be overlooked. In hand feeding, large feeds should not be given, and irregularities should be avoided as much as possible. The quantity, and also the nature of the food, will depend on the habits of the animal, and the work to which he is put If the work be hard, crushed oats and crushed maize mixed with good clean chaff, oaten or wheaten, should be the principal food, with an occasional bran mash at evening meal. If the animal be a poor feeder, or apt to waste his food, greater care must be taken in this respect. On no account should a horse be allowed to drink when heated, nor left to stand in a stable when in a heated condition. He should be supplied with pure water, allowed a cleanly and well-ventilated habitation; his body and limbs should be preserved free from dirt, and all offensive matter that may cling to them. Where many stock are kept on farms, they should all be seen at least once a day, for by this little attention losses may be avoided to the owner, as well as perhaps misery through accident.

Tatham.

Following are the names of office-bearers of the newly-formed branch at Tatham:—Chairman, Mr. M. F. Nolan; Vice-Chairmen, Messrs. McDonald and George Brooks; Treasurer, Mr. L. Richards; Hon. Secretary, Mr. J. J. Riley. The annual subscription fee has been fixed at 2s. 6d.

Toronto.

The annual meeting of this branch was held on 24th October.

The balance-sheet showed a credit of £1 12s. 9d., and the report stated that eight meetings had been held during the year, and two demonstrations given by Departmental officers.

The following office-bearers were elected for the ensuing year:—Chairman, Mr. J. Burten; Vice-Chairman, Mr. J. Denton; Treasurer, Mr. J. Cockburn; Hon. Secretary, Mr. J. G. Desreaux.

This branch proposes to hold a fruit and flower show, which is expected to prove an incentive to growers and producers in the district.

Apiary Notes.

December.

R. G. WARRY, Demonstrator in Apiculture.

PROSPECTS are bright in some localities for a good honey flow during this month, and in others an abundance of trees in bud encourages bee-farmers there to anticipate a heavy autumn flow. The advancing season will give opportunity in many apiaries to get good sets of comb built both for the extractor and the brood chamber. It is now recognised that during a good flow the more quickly colonies can be relieved of their ripe honey, and extracted comb or full sheets of comb foundation returned to them, the greater will be the weight of honey they produce for the extractor. To put this into practice, and at the same time allow room in the supers, requires plenty of spare combs. Extracting combs are only built to perfection during a good flow, but once they are obtained they can be used in the extractor time and again for years, provided they are protected from the wax moth during winter.

When a colony of bees is gathering honey quickly in warm weather, wax scales are formed by the workers automatically. Some provision must be made in the supers to allow the bees to make use of these scales, or they will be shed and thrown out at the entrance of the hive as an attraction to the wax moth. The same thing applies to swarms, and these will be issuing during this month in localities where rains have been late and the season is backward.

In both cases, either when a swarm is to be hived or a colony is gathering honey fast, ample provision must be made for comb building, otherwise a loss is entailed. This can be done by hiving a swarm on from two to five frames provided with full sheets of foundation, according to the size of the swarm, together with a store comb. Some fully-drawn empty combs, and, if no queen excluder is used and the swarm is not an after-swarm with a virgin queen, a sheet of open brood can be given as well. Hive the swarm on the stand from which it issued, and move the parent colony to another stand; this tends to prevent the parent colony throwing an after-swarm and strengthens the prime swarm by additional flying bees from the parent colony.

Large swarms issuing at the height of a flow can be hived in a ten-frame brood chamber filled with frames as described, and a super of Langstroth, or two supers of shallow extracting combs, can be given at once. It must be remembered, however, that the bees composing the swarm have issued with their honey sacs loaded, and the heat of the cluster induces wax secretion, hence the sheets of foundation in the brood chamber are given to provide an outlet for the wax secreted, and if the flow is good, even more foundation in the extracting supers will be advisable. In the case of a strong colony working well in the supers, provision can be made to deal with wax secretion by using one comb less in the extracting supers than the full number

the super will hold, *i.e.*, in a ten-frame super, use nine combs, and in an eight-frame super use seven combs. In the brood chamber, however, always use the full number.

When uncapping, an extracting comb is cut down to the width of the wood of the frame; it is then returned to a colony, and if the supers are prepared as described the wide spacing allows the beees to lengthen the cell walls and produce a "fat" comb, thus utilising any wax scales they may secrete during the flow. Combs finished in this way will be appreciated in the extracting room.

Bee-keeping is an intense culture, the aim of the apiarist being to improve the average yield per colony in the apiary. Seasons for bee-farmers vary considerably; in some years an apiary may be increased by ten or fifteen colonies without fear of overstocking, whilst in other years no increase, or even a smaller number of colonies, is advisable. If the locality is overstocked, the yield from the whole will be less than that from the right number, and will entail more labour in harvesting.

A flow will test the honey-getting capacity of each colony, and show the bee-farmer those colonies which are more profitable than others. Whilst extracting, a record should be kept of the weight of honey produced by each colony, and at the end of the flow the average yield per colony for the whole apiary can thus be obtained. Any colonies falling below the average can be marked for attention, the most probable need being re-queening.

The success of a colony, meaning by success a profitable yield of surplus honey, depends mainly upon two things during the summer flow—(1) an active queen, whose progeny are good honey-getters; and (2) sound sets of comb which enable the bee-keeper to remove the honey, extract it, and return the empty combs as fast as possible.

In most apiaries, little attention is given to breeding and rearing queen bees; queenless colonies are given a ripe cell taken indiscriminately from any colony which may happen to be about to swarm, or if no cells are available, unsealed brood from any colony is given for the queenless stock to rear an emergency queen for itself. Sometimes queens are purchased from a breeder and introduced in the apiary. The last is by far the best plan of the three; but a still better method is occasionally to buy a few tested queens from a good breeder, and breed in the home apiary from the best of these, replacing every queen whose colony yields less than the average for the apiary by one reared from the best breeding stock. A plan such as this will result in an improvement in stock every season, whilst the average weight of honey gathered per colony will increase.

The apiary at the Hawkesbury Agricultural College has been specially laid out and stocked for rearing queen bees, with a view to providing bee-keepers with queens bred from the best honey-producing stocks and imported queens. Inquiries and orders for queens should be addressed to the Principal. Prices are as follow:—

Untested, 4s. each. Tested, 7s. 6d. each for four or less.

Tested, 6s. each for from five to eight.

A few selected tested queens will be available in February next at 15s. each.

Orchard Notes.

December.

W. J. ALLEN.

Irrigation.

Where this is practised, see that the soil in which the trees or vines stand is well soaked to a good depth, and loosen up around all young trees and vines with a fork-hoe. Frequent cultivation should be carried out between each irrigation so as to secure a good soil mulch, for the conservation of moisture.

Harvesting.

During the next few months, growers will be particularly busy with the picking, packing, and marketing of their fruit. The greatest care should be exercised to pick in a careful manner, being sure to remove the fruit from the tree in the cool part of the day. In the packing of the fruit grading plays a prominent part. There is too little care exercised in this direction. Without close grading, packing cannot show to advantage, nor the fruit open up uniformly in the market.

Cultivation.

The land should be cultivated and cross-cultivated immediately after rain; or, where irrigation is practised, after each watering. In addition to this, the soil around trees and vines which cannot be stirred with the cultivator should be broken up with the fork-hoe. By following this system of working either orchards or vineyards, evaporation of soil moisture is prevented and the greatest amount of soil moisture conserved. Regular working of the ground is necessary to keep it in proper condition, even though rain should not fall or irrigation not be practised, as such a stirring will keep the weeds under and help to maintain a proper soil mulch, which prevents excessive loss of moisture.

Where couch grass is found growing it should either be ploughed up or dug out on a hot day, so that the roots may be exposed to the rays of the sun and drying winds, which soon kill them. After ploughing they require frequent stirrings so as to bring as many as possible of the roots to the surface.

Fighting Pests.

So long as the codlin moth, scales, and other pests are with us, it will be necessary to maintain a systematic fight to keep them in check. It is difficult to say just how many times it will be necessary to spray to keep the moth in check, but it is considered that for this State late varieties will require four applications to secure the best results. Growers should use

every endeavour to keep it under, and not try to economise by omitting an application. If in doubt as to whether or not the trees should be sprayed, it is best to err on the safe side and make the application, as it is often found that this pest is very active during the latter part of the season. It is frequently found, when harvesting operations commence, that had another spraying been given some time late in January, or early in February, the percentage of affected fruit would have been greatly reduced.

Destroying all fallen and infested fruit has proved to be a valuable method of control in connection with a number of pests.

Scale Insects.

Either fumigate or spray with resin-soda wash for the purpose of destroying these pests. If fumigation is practised, see that it is carried out during early morning or late evening, or at night time, but not during the heat of the day. Never fumigate soon after the trees have been sprayed with Bordeaux mixture, otherwise the trees will be defoliated.

Fruit Fly.

All fallen fruit should be regularly picked up and destroyed, either by burning or boiling. If growers neglect this important work they render themselves liable under the Fruit Pests Act. It is in the interest of every grower to prevent, as far as possible, the spread of this pest. Kerosene traps are an excellent means for trapping the fly. Shallow tins are preferable to deep ones, and they should be hung on the sunny side of the trees. Saucers may be used if tins are not available.

Pear Slug.

Cherry, pear, and other trees affected with the pear slug should be sprayed with arsenate of lead (commercial form).

Vine Moth.

This insect has been very prevalent this season; a thorough spraying with arsenate of lead of the strength prescribed by the codlin moth regulations, will be found satisfactory.

Passion Vines.

Those vines which have been properly pruned and manured during November will now be putting on good growth and blooming freely. This fruit will be ready to meet the demand at Easter, when it usually finds a ready sale at good prices.

Pineapples.

In tropical districts pineapples may be planted if moist weather prevails. Suckers are the best to plant, being much the strongest and earliest to arrive at maturity. Being great feeders, a dressing of strong nitrogenous fertiliser will promote rapid growth and fine fruit. While the plants are young, cultivation must be thorough, but not deep enough to cut the feeding roots, which are always near the surface.

Suckering.

Remove all suckers and other unnecessary growths from trees and vines. This important work is too often neglected.

Drying Apricots

Apricot drying will commence this month. See that the fruit is properly ripe before it is picked; and immediately it is cut and placed on trays, remove it to the fumigator, and keep it away from draughts and sun until it has been exposed to the sulphur fumes. After it has been subjected to the fumes for about three hours, the fruit may still remain in the closed room until the centre—that is the depression made by removing the stone—is full of juice. The fruit should then be placed in the sun and allowed to remain until most of the moisture is removed, when the fruit is found to be tough, but not hard.

Specimens of Fruit.

From time to time specimens of fruit for naming are received from different growers throughout the State. Many of these specimens are submitted without any description of the habit or growth of the trees, or any particulars whatever. It is advisable that those who forward specimens for the purpose of naming should give a full description of the tree, when the fruit ripens, the name (if any) by which the fruit is known in the district, and any other information which may be helpful. At least three typical specimens should always be sent.

Fruit-drying ground at Wagga Experiment Farm.

Trays stacked and covered.

Government Stud Bulls available for service at State Farms, or for lease.

Breed.	Name of Bull.	Sire.	Dam.	Stationed at—	Engaged up till—
Shorthorn ...	Melba's Emblem (183 M.S.H.B.)	Emblem of Darbalara (100 M.S.H.B.)	Melba 3rd of Darbalara (1058 M.S.H.B.)	Berry Farm ...	‖
" ...	Imperialist ...	Florio	Lady Nancy of Minembah.	Berry Farm ...	*
" ...	The Irishman (imp.)	Tipperary Bull	Colleen Bawn (imp.)	Robertson ...	17 Mar., '15.
Jersey ...	Grenadin (imp.)	Attorney (9477)	Cyril's Carnation (imp.).	Yanco Farm ...	*
" ...	Trafalgar ...	Best Man ...	Rum Omelette	Cowra Farm ...	*
" ...	Kaid of Khartoum	Sir Jack ...	Egyptian Belle	H. A. College ...	*
" ..	Leda's Retford Pride.	Dinah's Lad ...	Leda's Angel..	Wagga Farm ...	‖
Guernsey ..	The King's Mirror	Calm Prince ...	Vivid (imp.)...	South Kyogle ...	15 Feb., '15.
" ...	Star Prince ...	Calm Prince ...	Vivid (imp.)...	Casino	— April, '15.
" ...	Sky Pilot ...	Prince Souvia ...	Parson's Red Rose (imp.).	Maclean	11 Jan., '15.
" ...	Godolphin Moses (imp.)	Golden Hero of the Vauxbelets (1929)	Rosetta (6509)	Inverell	6 April, '15.
" ...	Hayes' Fido (imp.).	Hayes' Coronation 3rd.	Hayes' Fi-Fi 2nd.	Wollongbar Farm	‖
" ...	Claudius (imp.)	Golden Star II..	Claudia's Pride (imp.).	Murwillumbah ...	1 Jan., '15.
" ...	George III ...	King of the Roses	Calm 2nd ...	Wollongbar Farm	‖
" ...	The Peacemaker	Calm Prince ...	Rose Petersen	Wollongbar Farm	*
" ...	King of the Roses	Hayes' King ...	Rosey 8th (imp.).	Pambula	31 Dec., '14.
" ...	Lauderlad ...	Laura's Boy ...	Souvenir of Wollongbar	Mullumbimby ...	6 April, '15.
" ...	Belfast	King of the Roses	Flaxy 2nd ...	Tyalgum	28 May, '15.
" ...	Royal Preel ...	Itchen Royal ...	Hayes' Lily du Preel (imp.).	Tyalgum	30 Jan., '15.
" ...	Alexander the Great.	Claudius (imp.)	Alexandrina of Richmond.	Frederickton ...	25 Mar. '15.
" ...	Duke of Orleans	Godolphin Arthur (1664)	Flower of the Preel 3rd (imp.)	Paterson-Vacy ..	11 Mar., '15.
Ayrshire ...	Dan of the Roses	Daniel of Auchenbrain (imp.).	Ripple Rose...	Grafton Farm ...	*
" ...	Wyllieland Bright Lad (imp.)	Wyllieland Gleniffer (7229)	Wyllieland Sangie	Glen Innes Farm..	*
" ...	Isabel's Majestic	Majestic of Oakbank.	Isabel of Gleneira.	Grafton Farm ...	‖
Kerry... ...	Rising Sun ...	Bratha's Boy ...	Dawn ..	Bathurst Farm ...	*

*Available for service only at the Farm where stationed. † Available for lease or for service at the Farm where stationed
‖ Available for special service where stationed upon application to the Under Secretary.

Department of Agriculture,
Sydney, 2nd December, 1914.

BULLS FOR SALE

AT BERRY EXPERIMENT FARM.

IRISH SHORTHORN.—Irish Boy (577): Date of birth, 9th April, 1912; colour, rich roan; sire, Limerick's Lad (imp.); dam, Colleen Bawn (imp.). Price, **40 guineas.** Passed for Vol. IV of M.S.H.B.

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Colleen Bawn	6,937	3·8	309

GUERNSEYS.—Mountain Prince (593): date of birth, 12th January, 1913; colour, lemon and white; sire, Calm Prince; dam, Angelica 8th (imp.). Price, **30 guineas.**

Rohais' Lad (601): date of birth, 18th March, 1913; colour, lemon and white; sire, Calm Prince; dam, Rohais' Lassie (imp.). Price, **40 guineas.**

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Rohais' Lassie	5,537	5·1	333

Othello (605): date of birth, 4th April, 1913; colour, lemon and white; sire, Trengwainton Village Favourite (imp.); dam, Desdemona 8th (imp.). Price, **35 guineas.**

Milk yield of dam :—	Milk lb.	Fat per cent.	Butter lb.
Desdemona 8th (imp.)	6,721	4·3	340

Four-leaf Shamrock (584): date of birth, 26th November, 1912; colour, lemon and white; sire, Calm Prince; by Rose Prince (imp.); dam, Shamrock of Les Vesquesses (imp.) (5394), by Royal Blood 5th (1111). Price, **30 guineas.**

	Milk lb.	Fat test pe cent.	Butter lb.
Milk yield of dam	4,941	4·9	285

King of the Preel (592): date of birth, 31st November, 1912; colour, lemon and white; sire, Trengwainton Village Favourite (imp.) (2102); dam, Flower of the Preel 3rd (imp.) (209). Price, **30 guineas.**

	Milk lb.	Fat test per cent.	Butter lb.
Milk yield of dam	6,137	4·6	332

JERSEY.—Bridegroom (515): date of birth, 25th October, 1911; colour, whole fawn; sire, Best Man, 220 A.J.H.B., recently sold for £150; dam, Golden Omelette, 438 A.J.H.B.; by Sir Jack, 188 A.J.H.B.; from Rum Omelette 2nd, 699 A.J.H.B.; by Golden Lord (imp.), 39 A.J.H.B.; from Rum Omelette (imp.), 210 A.J.H.B. Price, **£21.**

Best Man, 220 A.J.H.B., is by Melbourne (imp.), 56 A.J.H.B.; from Lady Tidy 3rd (imp.), 128 A.J.H.B.

Milk yield :—	Milk lb.	Test.	Butter lb.
Dam, Golden Omelette	3,064	5·6	202 (in 28 weeks).
G dam, Rum Omelette 2nd ...	5,109	4·8	289
G g dam, Rum Omelette	6,077	—	332
Lady Tidy 3rd (imp.)	5,678	5	333

BULLS FOR SALE—*continued.*

HOLSTEINS.—Captain Muller (No. 609), calved 16th May, 1913; colour, black and white; sire, Powerful of Brundee, by Edinglassie (imp.); dam, Miss Muller, by Hollander, by Bosch 3rd (imp.); g d, Margosa, by Garfield (imp.); g g d, Maggie Obbe, by Obbe (imp.); g g g dam, Margaretha (imp.) **Price, 15 guineas.**

Milk yields :—

	Milk lb.	Test per cent.	Butter lb.
Miss Muller (first calf)	7,262	3·4	288
Margosa	6,349	3·2	237
Maggie Obbe	7,699	—	272
Margaretha (imp)	10,990	—	407

No. 625 (unnamed), calved 19th September, 1913; colour, black and white; sire, Cavalier, by De Wet, from Fraulien Arama; dam, Lolkje Amster, by Amsterdam g dam, Lolkje, by Joubert, from Lolkje Veeman (imp.); Amsterdam was by Garfield (imp.), from Lady Margaret, by Obbe (imp.), from Schot 5th (imp.). Price, **20 guineas.**

Milk yields :—

	Milk lb.	Test per cent.	Butter lb.
Lolkje Amster (295 days) ...	6,012	—	259
Lolkje (first calf)	5,828	3·5	234
Lady Margaret (first calf) . .	6,000	—	277

GEORGE VALDER, Under Secretary, and
Director of Agriculture.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1915.

Society.	Secretary.	Date.
Gosford and Brisbane Water A. and H. Association	H. J. Gates	Jan. 15, 16
Albion Park A., H., and I. Association	M. A. Brown	,, 20, 21
Kiama A. Association	G. A. Somerville	,, 26, 27
Wollongong A., H., and I. Association	W. J. Cochrane	,, 28, 29, 30
Berry A. Association	S. G. Banfield	Feb. 4, 5
Wyong A. Association	C. R. Seabrook	,, 5, 6, 7
Moruya A. and P. Society	H. P. Jeffery	,, 10, 11
Shoalhaven A. and H. Association (Nowra)	H. Rauch	,, 10, 11
Newcastle A., H., and I. Association	E. J. Dann	,, 10 to 13
Central Cumberland A. and H. Association (Dural)	H. A. Best	,, 19, 20
Dapto A. and H. Society	J. H. Lindsay	,, 23, 24
Guyra P., A., and H. Association	P. N. Stevenson	,, 23, 24, 25
Alstonville A. Society	C. D. McIntyre	,, 24, 25
Campbelltown A. Society	F. Sheather	,, 24, 25
Manning River A. and H. Society (Taree)	L. Plummer	,, 24, 25
Gunning P., A., and I. Society	J. R. Turner	,, 24, 25

AGRICULTURAL SOCIETIES' SHOWS—*continued.*

1915.

Society.	Secretary.	Date.
Tumut A. and P. Association	T. E. Wilkinson	Mar. 2, 3
Uralla A. Association	H. W. Vincent	" 2, 3, 4
Tenterfield P., A., and M. Society	F. W. Hoskin	" 2, 3, 4
Bega A., P., and H. Society	H. J. B. Grime	" 3, 4
Braidwood P., A., and H. Association	L. Chapman	" 3, 4
Gloucester A., H., and P. Association	G. E. Furness	" 3, 4
Camden A., H., and I. Society	A. Thompson	" 3, 4, 5
Berrima District A., H., and I. Society (Moss Vale)	C. E. Wynne	" 4, 5, 6
Blayney A. and P. Association	H. R. Woolley	" 9, 10
Glen Innes & Central New England P. & A. Assoc'n	G. A. Priest	" 9, 10, 11
Coramba District P., A., and H. Society	H. E. Hindmarsh	" 10, 11
Tumbarumba and Upper Murray P. and A. Society	E. W. Figures	" 10, 11, 12
Nepean District A., H., and I. Society (Penrith)	P. J. Smith	" 11, 12
Gundagai P. and A. Society	A. Elworthy	" 16, 17
Mudgee A., P., H., and I. Association	P. J. Griffin	" 16, 17, 18
Cobargo A., P., and H. Society	T. Kennelly	" 17, 18
Inverell P. and A. Association	J. McIlveen	" 17, 18, 19
Wallamba District A. and H. Association (Nabiac)	T. R. Dun	" 18, 19
Goulburn A., P., and H. Society	G. G. Harris	" 18, 19, 20
Quirindi P., A., and H. Association	H. H. Rourke	" 23, 24
Batlow A. Society	C. S. Gregory	" 23, 24
Luddenham A. and H. Society (Wallacia)	F. S. Leggo	" 23, 24
Molong P. and A. Association	W. J. Windred	" 24
Warialda P. and A. Association	C. O'C. Murray	" 23, 24, 25
Bangalow A. and I. Society	W. H. Reading	" 23, 24, 25
Macleay A., H., and I. Association (Kempsey)	E. Weeks	" 24, 25, 26
Upper Hunter P. and A. Association (Muswellbrook)	R. C. Sawkins	" 24, 25, 26
Dorrigo A., H., and I. Society	W. R. Colwell	" 24, 25
Coonabarabran P. and A. Association	G. B. McEwen	" 24, 25
Crookwell A., P., and H. Society	J. H. Huxley	" 25, 26
Eastern Dorrigo District A., H., and I. Society (Ulong)	T. B. Timms	April 5
Adaminaby P. and A. Association	W. Delany	" 7, 8
Orange A. and P. Association	W. J. I. Nancarrow	" 21, 22, 23
Dungog A. and H. Association	C. E. Prout	" 28, 29
Clarence P. and A. Society (Grafton)	G. N. Small	May 5, 6, 7
Lower Clarence A. Society (Maclean)	J. McPherson	" 11, 12
National A. and I. Ass. of Queensland (Brisbane)	J. Bain	Aug. 9–14
Narandera P. and A. Association	H. S. Robinson	" 10, 11
Murrumburrah P., A., and I. Association (Wagga)	A. F. D. White	" 24, 25, 26
Gunnedah P., A., and H. Association	M. C. Tweedie	" 24, 25, 26
Murrumbidgee P. and A. Association (Wagga)	A. F. D. White	" 24, 25, 26
Cowra P., A., and H. Association	E. W. Warren	Sept. 14, 15
Temora P., A., H., and I. Association	A. D. Ness	" 21, 22, 23
Northern A. Association (Singleton)	J. McLachlan	" 22, 23, 24
Yass P. and A. Association	E. A. Hickey	" 29, 30

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